Chapter 15: Air Quality

A. INTRODUCTION

As described in Chapter 1, "Project Description," the New York City Department of City Planning (DCP) is proposing a series of land use actions (the Proposed Actions) to support and facilitate implementation of the Long Island City Neighborhood Plan. The Project Area is generally bounded by Queens Plaza South and the midblock between 39th and 40th Avenues between 21st and 23rd Streets to the north; the East River, Anable Basin, and 5th Street to the west; 46th and 47th Avenues, 46th Road, and the midblock between 44th Drive and 45th Avenue to the south; and 11th, 23rd, and 24th Streets and the midblock between 24th and Crescent Streets to the east. A total of 52 projected development sites and 15 potential development sites have been identified in the Project Area on which new buildings could be constructed over an approximately 10-year construction period through the year 2035. Since potential development sites are less likely to be developed over the analysis period, they are not evaluated for construction impacts.

The potential for air quality impacts from the Proposed Actions is examined in this chapter. Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heat and hot water systems, or emissions from parking garage ventilation systems. Indirect impacts are caused by off-site emissions associated with a project such as emissions from nearby existing stationary sources (i.e., impacts on the projected and potential development sites) or by emissions from on-road vehicle trips generated by the Proposed Actions or other changes to future traffic conditions due to a project.

The maximum projected hourly incremental traffic volumes generated by the Proposed Actions would exceed the 2021 *City Environmental Quality Review (CEQR) Technical Manual* carbon monoxide (CO) screening threshold of 170 peak-hour vehicle trips at a number of intersections in the study area, as well as the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311, of the *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from traffic generated by the Proposed Actions was performed for CO and PM.

In addition, the Proposed Actions would include accessory parking at certain development sites within the rezoning area. Therefore, an analysis was conducted to evaluate potential future pollutant concentrations from the proposed parking facilities.

The Proposed Actions would introduce sensitive uses (residential uses) within 200 feet of the elevated section of the Ed Koch Queensboro Bridge and associated ramps. The effect of these existing roadways on the Proposed Actions was therefore analyzed, as recommended in the *CEQR Technical Manual*.

It was assumed that each of the projected and potential development sites would include fossil fuel-fired heat and hot water systems. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations with the Proposed Actions.

Since portions of the affected area are within areas zoned for manufacturing uses, potential effects of stationary source emissions from existing nearby industrial facilities on the Proposed Actions were assessed. Potential effects from industrial sources associated with the Proposed Actions were reviewed. In addition, potential effects from large and major sources of emissions in the study area on the Proposed Actions were evaluated.

PRINCIPAL CONCLUSIONS

The mobile source analyses determined that concentrations of CO and $PM_{2.5}$ due to project-generated traffic at intersections would not result in any violations of National Ambient Air Quality Standards (NAAQS) at ~~one~~ two of the ~~two~~ three analyzed intersections for CO and at three of the ~~four~~ five analyzed intersection locations for $PM_{2.5}$. However, the 1-hour and 8-hour CO maximum concentrations are predicted to exceed the NAAQS at the intersection of Vernon and 46th Avenue ~~.~~and the 8-hour CO maximum concentration is predicted to exceed the ~~NAAQS and~~ *de minimis* criterion~~a~~ at the intersection of Vernon Boulevard and 46th Avenue and Vernon Boulevard and 48th Avenue. The maximum 24-hour $PM_{2.5}$ concentrations are predicted to exceed the NAAQS at the intersection of Vernon Boulevard and 46th Avenue and the *de minimis* criterion at the intersections of ~~Vernon Boulevard and 44th Drive and~~ Vernon Boulevard and 46th Avenue and Vernon Boulevard and 48th Avenue. At the intersections of Vernon Boulevard and 46th Avenue and Vernon Boulevard and 48th Avenue, the total annual $PM_{2.5}$ concentration is predicted to exceed the NAAQS. Furthermore, at each of the ~~four~~ five intersection sites analyzed, the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion. This would be considered a significant adverse air quality impact. Traffic mitigation measures were examined to avoid potential significant impact at the affected intersection locations. Mitigation measures are discussed in Chapter 21, "Mitigation." Between the Draft and Final EIS, additional review and evaluation ~~will be~~was performed using more comprehensive analysis procedures ~~which is expected~~ to determine ~~that~~ whether the identified impacts related to mobile source 24-hour and annual average $PM_{2.5}$ increments ~~will be~~were avoided. ~~Refined modeling using additional traffic periods will be performed to determine 24-hour average impacts from mobile sources at the affected intersection.~~ Additional modeling of $PM_{2.5}$ concentrations (Grid Analysis) ~~will be~~was performed using more refined or comprehensive analysis procedures to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from mobile sources. The analysis confirmed that at each of the intersections analyzed, annual incremental $PM_{2.5}$ concentrations are predicted to exceed the annual *de minimis* criterion threshold, which would constitute a significant adverse air quality impact. Other updates ~~may~~ included the use of newer vehicle emissions model data and projections. ~~It is anticipated that these additional measures will reduce $PM_{2.5}$ concentrations below the 24-hour and annual *de minimis* criterion thresholds.~~

The parking facilities assumed to be developed as a result of the Proposed Actions were analyzed for potential air quality effects. The analysis found that these parking facilities would not be expected to result in any significant adverse air quality impacts.

An analysis of the elevated section of the Ed Koch Queensboro Bridge and associated ramps determined that there would be no significant adverse air quality impacts on nearby development sites.

The stationary source analyses determined that there would be no potential significant adverse air quality impacts from fossil fuel-fired heat and hot water systems at the projected and potential development sites. At certain sites, an (E) Designation (E-848) would be mapped in connection with the Proposed Actions to ensure that future developments would not result in any significant adverse air quality impacts from fossil fuel-fired heat and hot water systems emissions. For the publicly ~~City~~owned parcels, restrictions would be necessary to ensure that emissions from fossil fuel-fired heat and hot water systems would not result in any significant adverse air quality impacts. These restrictions would be set forth in a Land Disposition Agreement (LDA) to ensure that the developer(s) satisfy these restrictions with oversight provided through the New York City Department of Housing Preservation and Development (HPD).

The analysis of existing sources associated with manufacturing and processing uses in the surrounding study area determined that emissions of air toxic compounds would not result in any potential significant adverse air quality impacts on the Proposed Project. An analysis of the cumulative impacts of existing industrial sources on projected and potential development sites was performed. Maximum concentration levels at projected and potential development sites were found to be below the applicable health risk criteria. At certain sites, an (E) Designation (E-848) would be mapped to ensure that the effects of emissions of air toxic compounds from existing industrial sources ~~is~~ are avoided. For development sites with anticipated industrial uses, an (E) Designation (E-848) would be mapped in connection with the Proposed Actions to ensure that there are no potential significant adverse impacts associated with air toxic compounds associated with these uses.

Large and major emissions sources within 1,000 feet of a projected or potential development site were also analyzed, and the analysis concluded that these sources would not result in significant adverse air quality impacts on any projected or potential development sites.

B. POLLUTANTS FOR ANALYSIS

Air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide [NO] and nitrogen dioxide [NO_2], collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel

vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO_2, SO_2, ozone, and lead are regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA), and are referred to as criteria pollutants; emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by EPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be analyzed on a local (microscale) basis.

The Proposed Actions would result in an increase in vehicle trips greater than the *CEQR Technical Manual* screening threshold of 170 trips at certain intersections. Therefore, a mobile source analysis was conducted to evaluate future CO concentrations with and without the Proposed Actions. In addition, the Proposed Actions would include parking facilities at certain development sites. Therefore, an analysis was conducted to evaluate future CO concentrations with the operation of the parking facilities assumed to be developed as a result of the Proposed Actions. In addition, potential effects of CO from the elevated Ed Koch Queensboro Bridge on the Proposed Actions were analyzed.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

The Proposed Actions would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of emissions of these pollutants from mobile sources related to the Proposed Actions was therefore not warranted.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has mostly been of concern farther downwind from large stationary sources, and not a local concern from mobile sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) With the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may be of greater concern. However, any increase in NO_2

associated with the Proposed Actions would be relatively small due to the very small increases in the number of vehicles. This increase would not be expected to significantly affect levels of NO_2 experienced near roadways. Furthermore, the monitored NO_2 concentrations at both near-road and rooftop monitoring sites (including monitored NO_2 concentrations at near road locations are well below the 1-hour NO_2 National Ambient Air Quality Standards (NAAQS) of 188 $\mu g/m^3$. Therefore, it is unlikely that the incremental congestion from the Proposed Actions at local intersection locations would result in an exceedance of the NO_2 NAAQS.

Potential impacts on local NO_2 concentrations from the fuel combustion for the projected and potential development sites' heat and hot water systems were evaluated.

LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of the Proposed Actions. Therefore, an analysis of this pollutant was not warranted.

RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source) or from precursor gases reacting in the atmosphere to form secondary PM.

Gasoline-powered and diesel-powered vehicles, especially heavy-duty trucks and buses operating on diesel fuel, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may consequently be locally elevated near roadways. Since the traffic generated by the Proposed Actions would exceed the $PM_{2.5}$ emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*, a

quantified assessment of emissions from traffic generated by the Proposed Actions was performed for this pollutant and an analysis was conducted to evaluate future $PM_{2.5}$ concentrations with the operation of the parking facilities assumed to be developed as a result of the Proposed Actions.

An assessment of $PM_{2.5}$ emissions from heat and hot water systems at the projected and potential development sites was conducted, following the *CEQR Technical Manual* and EPA guidance. In addition, potential effects of $PM_{2.5}$ from the elevated Ed Koch Queensboro Bridge on the Proposed Actions were analyzed.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road and non-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant and therefore analysis of SO_2 from mobile and/or non-road sources was not warranted.

As part of the Proposed Actions, No. 2 fuel could be burned in heat and hot water systems of the projected and potential development sites. Therefore, potential future levels of SO_2 from these sources were examined.

NONCRITERIA POLLUTANTS

In addition to the criteria pollutants discussed above, noncriteria pollutants may be of concern. Noncriteria pollutants are emitted by a wide range of man-made and naturally occurring sources. These pollutants are sometimes referred to as hazardous air pollutants (HAP) and, when emitted from mobile sources, as Mobile Source Air Toxics (MSATs). Emissions of noncriteria pollutants from industries are regulated by EPA.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, the New York State Department of Environmental Conservation (DEC) has issued standards for certain noncriteria compounds, including beryllium, gaseous fluorides, and hydrogen sulfide. DEC has also developed guideline concentrations for numerous noncriteria pollutants. The DEC guidance document DAR-1[1] contains a compilation of annual and short-term (1-hour) guideline concentrations for these compounds.

The DEC guidance thresholds represent ambient levels that are considered safe for public exposure. EPA has also developed guidelines for assessing exposure to noncriteria pollutants. These exposure guidelines are used in health risk assessments to determine the potential effects to the public.

The Project Area contains existing manufacturing-zoned areas, which would remain in the Proposed Actions. Therefore, an analysis to examine the potential for impacts to the Proposed Actions from industrial emissions was performed. In addition, certain projected and potential development sites are assumed to include light industrial uses in the With

[1] DEC. DAR-1 (Air Guide-1) AGC/SGC Tables, February 2021.

Action condition, and therefore the potential effects of such uses on existing and proposed developments were reviewed.

C. AIR QUALITY REGULATIONS, STANDARDS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table 15-1**. In addition, New York State has adopted 3-hour and 24-hour ambient air quality standards for New York State, but are defined on a running 12-month basis. New York State also has standards for total suspended particles, settleable particles, and 24-hour and annual SO_2, which correspond to federal standards that have since been revoked or replaced, and for the noncriteria pollutants fluoride and hydrogen sulfide.

EPA has revised the NAAQS for $PM_{2.5}$, effective March 6, 2024. The revision included lowering the level of the annual $PM_{2.5}$ primary standard from the current level of 12 micrograms per cubic meter ($\mu g/m^3$) to 9 $\mu g/m^3$ and retaining the level of the 24-hr primary and secondary standard at 35 $\mu g/m^3$. In addition, the PM_{10} 24-hour average primary and secondary standard was retained.

Federal ambient air quality standards do not exist for noncriteria pollutants; however, as mentioned above, DEC has issued standards for three noncriteria compounds. DEC has also developed a guidance document DAR-1 (February 2021), which contains a compilation of annual and short term (1-hour) guideline concentrations for numerous other noncriteria compounds. The DEC guidance thresholds represent ambient levels that are considered safe for public exposure.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment.

In 2002, EPA re-designated New York City as in attainment for the 1-hour and 8-hour CO NAAQS.

Table 15-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average	9(1)	10,000	None	
1-Hour Average	35(1)	40,000		
Lead				
Rolling 3-Month Average	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average(2)	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average(3)	0.070	140	0.070	140
Respirable Particulate Matter (PM_{10})				
24-Hour Average(7)	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean(4)	NA	9	NA	15
24-Hour Average(5)	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average(6)	0.075	196	NA	NA
Annual Average(4)	NA	NA	0.010	26

Notes:
ppm—parts per million (unit of measure for gases only)
µg/m³—micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA—not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
(1) Not to be exceeded more than once a year.
(2) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration.
(3) 3-year average of the annual fourth-highest daily maximum 8-hr average concentration.
(4) 3-year average of annual mean.
(5) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(6) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.
(7) Not to be exceeded more than once a year on average over 3 years.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

Manhattan had been designated as a moderate NAA for PM_{10}. EPA clarified on July 29, 2015 that the designation only applied to the revoked annual standard.

The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties had been designated as a $PM_{2.5}$ NAA (New York Portion of the New York–Northern New Jersey–Long Island, NY–NJ–CT NAA) since 2004 under the CAA due to exceedance of the 1997 annual average standard, and were also nonattainment with the 2006 24-hour $PM_{2.5}$ NAAQS since November 2009. The area was redesignated as in attainment for that standard effective April 18, 2014, and is now under a

maintenance plan. DEC recently submitted a limited maintenance plan to EPA for the period 2024 to 2034, which is currently under review.

As described above, EPA has revised the $PM_{2.5}$ standard. DEC submitted a recommendation as in attainment of the 9 $\mu g/m^3$ NAAQS. $PM_{2.5}$ attainment designations under the new standard are expected to be effective by May 2026. For areas designated as non-attainment, $PM_{2.5}$ SIPs would be due by November 2027 and would be designed to meet the $PM_{2.5}$ standard by 2032, although this may be extended in some cases. On February 7, 2025, DEC made an initial recommendation that all of New York State be designated attainment for the 2024 $PM_{2.5}$ Annual and 24-hour NAAQS.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties (NY portion of the New York–Northern New Jersey–Long Island, NY-NJ-CT, NAA) as a moderate non-attainment area for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8–hour ozone standards, but certain requirements remain in areas that were either nonattainment or maintenance areas for the 1997 ozone standard ('anti-backsliding'). EPA designated the same NAA as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012, with subsequent reclassifications to "moderate" and "serious" nonattainment since compliance with the NAAQS was not achieved by the required attainment dates. On November 29, 2021, DEC presented a demonstration that the New York Metro Area (NYMA) was not projected to meet the July 20, 2021 attainment deadline and therefore requested that EPA reclassify the NYMA to "severe" nonattainment. EPA reclassified the NYMA from "serious" to "severe" NAA, effective November 7, 2022, which imposed a new attainment deadline of July 20, 2027 (based on 2018–2020 monitored data). On June 4, 2018, EPA designated the same area as a moderate NAA for the revised 2015 ozone standard. On June 4, 2024, DEC requested the reclassification of the NYMA from "moderate" to "serious" nonattainment" for the 2015 ozone NAAQS. EPA is currently reviewing revisions to New York's SIP plan.

New York City is currently in attainment of the annual-average NO_2 standard. EPA has designated the entire state of New York as "unclassifiable/attainment" of the 1-hour NO_2 standard effective February 29, 2012.

EPA has established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. EPA has designated the entire State of New York as in attainment for this standard, with the exception of a portion of St. Lawrence County which was designated as "nonattainment."

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[2] In terms of the magnitude of air quality impacts, any action predicted to increase the

[2] New York City. *CEQR Technical Manual*. Chapter 1, Section 222. December 2021; and SEQRA Regulations. 6 NYCRR § 617.7.

concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 15-1**) would be deemed to have a potential significant adverse impact. Similarly, for non-criteria pollutants, predicted exceedance of the DAR-1 guideline concentrations would be considered a potential significant adverse impact.

In addition, to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations would not be significantly increased in non-attainment areas, threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

CO DE MINIMIS CRITERIA

New York City has developed *de minimis* criteria to assess the significance of the increase in CO concentrations that would result from the impact of proposed projects or actions on mobile sources, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Action 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Action) concentrations and the 8-hour standard, when No Action concentrations are below 8 ppm.

$PM_{2.5}$ DE MINIMIS CRITERIA

The *de minimis* criteria New York City uses to determine the potential for significant adverse $PM_{2.5}$ impacts under CEQR are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard;
- Annual average $PM_{2.5}$ concentration increments which are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or
- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.3 µg/m3 at a discrete receptor location (elevated or ground level).

Actions under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the above *de minimis* criteria will be considered to have a potential significant adverse impact.

The above *de minimis* criteria have been used to evaluate the significance of predicted impacts of the Proposed Actions on $PM_{2.5}$ concentrations.

NON-CRITERIA POLLUTANT THRESHOLDS

Non-criteria, or toxic, air pollutants include a multitude of pollutants of ranging toxicity. No federal ambient air quality standards have been promulgated for toxic air pollutants. However, EPA and DEC have issued guidelines that establish acceptable ambient levels for these pollutants based on human exposure.

The DEC DAR-1 guidance document presents guideline concentrations in micrograms per cubic meter for the one-hour and annual average time periods for various air toxic compounds. These values (of DAR-1 February 2021) are provided in **Table 15-2** for the compounds affecting receptors located at projected and potential development sites. The compounds listed are those emitted by existing sources and the proposed sources of air toxics in the rezoning area.

Table 15-2
Industrial Source Analysis Relevant DEC Air Guideline Concentrations

Pollutant	CAS Number	SGC (µg/m^3)	AGC (µg/m^3)
Ethylbenzene	100-41-4	--	1,000
2-Pentanome, 4-Methyl =MIBK	108-10-1	31,000	3,000
Methoxypropylacetate	108-65-6	36,850	2,000
Trimethylbenzene, 1,3,5-	108-67-8	--	60
Methylcyclohexane	108-87-2	--	3,800
Toluene	108-88-3	37,000	5,000
5-methylhexan-2-one	110-12-3	23,350	560
Isobutyl Acetate	110-19-0	71,300	565
Methyl Amyl Ketone	110-43-0	--	550
Butyl Cellosolve	111-76-2	4,700	1,600
2-(2-butoxyethoxy)ethanol	112-34-5	370	200
Dioctyl Phthalate	117-81-7	--	0.42
Mica	12001-26-2	--	7.1
Butyl Acetate	123-86-4	71,300	565
Iron Oxide	1309-37-1	--	12
Nickel Oxide	1313-99-1	0.201	0.0053
Antimony Oxide	1314-60-9	--	1.3
Xylene	1330-20-7	22,000	100
Carbon Black	1333-86-4	--	7
Aluminum Oxide	1344-28-1	--	2.4
Titanium Dioxide	13463-67-7	--	24
Ethyl Acetate	141-78-6	--	3,400
Heptane, N-	142-82-5	210,000	3900
Formaldehyde	50-00-0	30	0.060
Amyl Acetate	628-63-7	53,000	630
Carbon Monoxide	630-08-0	40,000	10000
Naphtha, Heavy Alkylate	64742-47-8	--	900
Naphtha Light Aliphatic	64742-89-8	--	3200
Naphtha Heavy Aromatic	64742-94-5	--	100
Naphtha Light Aromatic	64742-95-6	--	100
Methanol	67-56-1	33,000	4,000
Isopropyl Alcohol	67-63-0	98,000	7,000
Acetone	67-64-1	180,000	30,000
Butanol	71-36-3	--	1,500
n-Pentanol	71-41-0	--	1500
Aluminum	7429-90-5	--	2.4

Table 15-2 (cont'd)
Industrial Source Analysis Relevant DEC Air Guideline Concentrations

Pollutant	CAS Number	SGC (µg/m^3)	AGC (µg/m^3)
Copper	7440-50-8	100	0.48
Sulfur Dioxide	7446-09-5	196	80
Lead	7489-42-1	0.15	--
Ethyl 3-Ethoxypropionate	763-69-9	140	64
Barium Sulfate	7727-43-7	--	12
Graphite	7782-42-5	--	4.8
Isobutyl Alcohol	78-83-1	--	360
MEK	78-93-3	13,000	5000
Petroleum Ether	8032-32-4	--	900
Dibutyl Phthalate	84-74-2	--	12
Butyl Benzyl Phthalate	85-68-7	--	0.42
Trimethylbenzene, 1,2,4-	95-63-6	--	60
Cumene	98-82-8	--	400
PM_{10}	NY075-00-0	150	--
$PM_{2.5}$	NY075-02-5	35	9
Nitrogen Dioxide	NY210-00-0	188	100
VOC	NY998-00-0	98,000	7,000

Notes:
(1) Used AGC and SGC for zirconium.
(2) Since VOCs are not assigned an SGC or AGC, the guideline concentrations for isopropyl alcohol were used for evaluation purposes.
Source: DEC, DAR-1 AGC/SGC Tables, February 2021

In order to evaluate impacts of non-carcinogenic toxic air emissions, DAR-1 includes a methodology called the "hazard index" to characterize the cumulative risk from potential air toxic emissions. The hazard index is based on predicted annual concentrations and annual exposure limits. If the combined ratios of pollutant concentration divided by its respective annual exposure threshold for each of the toxic pollutants is found to be less than 2, no significant adverse air quality impacts are predicted to occur due to these pollutant releases.

In addition, DEC characterizes risks of non-criteria carcinogenic pollutants. According to DAR-1, an overall incremental cancer risk from a proposed action of less than one-in-one million is considered to be insignificant. The potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of all of the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all of the carcinogenic toxic pollutants combined is less than one-in-one million, no significant air quality impacts are predicted to occur due to these pollutant releases. Alternatively, if refined air dispersion modeling is used to estimate the maximum concentrations of pollutants, a threshold of 10-in-one-million excess cancer risk for non-criteria carcinogenic compounds can be used.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

Vehicle emission modeling and dispersion modeling were updated between the Draft and Final EIS to reflect the updated traffic No Action and With Action data and newer DEC vehicle registration data. Additional modeling of annual $PM_{2.5}$ concentrations was performed using a comprehensive procedure (grid analysis) to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from mobile sources.

INTERSECTION SCREENING

An intersection screening analysis was conducted to determine potential for impacts from CO, and PM due to vehicular traffic anticipated to be generated by the Proposed Actions using the methodology set forth in the *CEQR Technical Manual*. Projected incremental traffic data were evaluated for each intersection in the traffic network. These data included project total and truck incremental traffic for each of the peak periods (weekday AM, MD, PM, and weekend).

For the CO screening, the total incremental increase in the number of project-generated trips at each intersection was compared with the *CEQR Technical Manual* of 170 vehicles. For the PM screening, the procedure outlined in the 2021 *CEQR Technical Manual* is based on determining whether the projected number of vehicles trips at an intersection exceeds thresholds based on heavy-duty diesel vehicle (HDDV) equivalents. The thresholds are as follows:

- 12 or more HDDV for paved roads with average daily traffic fewer than 5,000 vehicles;
- 19 or more HDDV for collector roads;
- 23 or more HDDV for principal and minor arterials; or
- 23 or more HDDV for expressways and limited access roads.

The screening worksheet referenced in Section 201 of the *CEQR Technical Manual* was utilized to calculate the number of heavy-duty truck equivalents at each intersection. The worksheet uses vehicle classification information based on the traffic data collected for the project and assigns these classifications to vehicle categories using a table referenced in the *CEQR Technical Manual*[3]. Roadway classifications were determined by corridor at each intersection, based on New York City Department of Transportation (DOT) functional class criteria and With Action traffic volumes. For the PM screening, all trucks that would be generated by the Proposed Actions were classified using the HDDV8B vehicle category, although the actual truck types associated with the Proposed Actions would consist of a mix of delivery and trailer trucks. All other vehicles were classified as LDGT1, which is considered most representative of the automobile category among the vehicle types listed in the worksheet.

The prediction of vehicle-generated emissions and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical

[3] MOBILE6 Input Data Format Reference Tables, August 14, 2003.

configuration. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and physical configuration combine to affect pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions, and since it is necessary to predict the reasonable worst-case condition, most dispersion analyses predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analyses for the Proposed Actions employ models approved by EPA that have been widely used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could ensue from the Proposed Actions.

INTERSECTION ANALYSIS

Vehicle Emissions

Engine Emissions

Vehicular cruise and idle CO and $PM_{2.5}$ emission factors utilized in the dispersion modeling were computed using EPA's mobile source emissions model, Motor Vehicle Emission Simulator (MOVES5).[4] This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current guidance available from DEC.

Project specific vehicle classification data obtained through field studies were mapped to the 13 vehicle categories defined in the MOVES model based on New York State vehicle registration data in accordance with the current guidance in the *CEQR Technical Manual*. County-specific hourly temperature and relative humidity data obtained from DEC were used.

Road Dust

To account for the suspension of fugitive road dust in air from vehicular traffic in the local microscale analysis, $PM_{2.5}$ emission rates included fugitive road dust. However, fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analyses, since the New York City Department of Environmental Protection (DEP) considers it to have an insignificant contribution on that scale. Road dust emission factors were calculated according to the latest procedure delineated by EPA[5] and the *CEQR Technical Manual*.

[4] EPA, Motor Vehicle Emission Simulator (MOVES): User Guide for MOVES2014a. EPA420B15095. November 2015. Overview of EPA's Motor Vehicle Emission Simulator (MOVES5). November 2024, EPA-420-R-24-011.

[5] EPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1. NC. http://www.epa.gov/ttn/chief/ap42. January 2011.

Traffic Data

Traffic data for the intersection analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the Proposed Actions (see Chapter 14, "Transportation"). Traffic data for the Future without the Proposed Actions (the No Action condition) and the With Action condition were employed in the respective air quality modeling scenarios. The peak morning, midday, and evening period traffic volumes were used as a baseline for determining off-peak volumes for weekdays, and the peak Saturday period was used for weekend days. Off-peak traffic volumes in the No Action condition, and off-peak increments from the Proposed Actions were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations. For annual impacts, average weekday and weekend 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

For the mobile source grid analysis, on roadways with traffic information the same traffic volume and emission rates were used for roadways with traffic information. All intersections analyzed for the traffic study within the area for each grid were included for the grid analysis (signalized and unsignalized). For roadways without traffic information, traffic volume and emission rates were selected based on the nearest representative roadway with traffic volume information. Available data (e.g., speeds, vehicle classification data, volumes) from the Traffic Information Management System (TIMS) developed by the DOT, as well as data maintained by the New York State Department of Transportation (NYSDOT), were used.

Dispersion Modeling

Potential impacts from the Proposed Actions' mobile sources were predicted using the American Meteorological Society/EPA Regulated Model (AERMOD) Version 24142.[6] AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. AERMOD is a recommended model for transportation air quality analyses, and EPA mandated its use for transportation conformity purposes after a three-year transition period.[7]

The analysis was performed using an EPA line source representation of emission sources in order to simulate traffic-related air pollutant dispersion.[8] In addition, the weighted average release height and initial vertical source parameters were calculated for each modeled roadway.

For the $PM_{2.5}$ analysis, 24-hour traffic volumes were estimated using peak hour volumes as a baseline to determine volumes throughout the day. Off-peak traffic volumes were

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[6] EPA. *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*. Office of Air Quality Planning and Standards. EPA-454/B-24-007, November 2024.

[7] EPA. Revisions to the Guideline on Air Quality Models: Final rule.89 FR 95043.

[8] EPA. *Project-Level Conformity and Hot-Spot Analyses*, available at: https://www.epa.gov/state-and-local-transportation/project-level-conformity-and-hot-spot-analyses#pmguidance

determined by adjusting the peak period volumes by the 24-hour distributions from available data at appropriate locations.

Meteorology

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed, and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular prediction location (receptor).

The AERMOD model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists of surface data collected at the LaGuardia Airport National Weather Service Station (NWS) and upper air data collected at Brookhaven, New York for the period 2015–2019.[9] The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data are processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data are available were classified using categories defined in digital United States Geological Survey (USGS) maps. The meteorological dataset processed with the AERMET Version 21112 processor, provided by the DEC, was used for the analysis.[10]

All hours were modeled, and the highest resulting concentration for each averaging period were presented, based on the form of the standard or criterion.

Analysis Year

The microscale analyses were performed for 20352~~2040~~, the year by which development facilitated by the Proposed Actions are likely to be completed. The future analysis was performed for both without the Proposed Actions (the No Action condition) and with the Proposed Actions (the With Action condition).

Background Concentrations

Background concentrations are those pollutant concentrations originating from distant sources that are not directly included in the modeling analysis, which directly accounts for vehicular emissions on the streets within 1,000 feet and in the line of sight of an analysis site. Background concentrations must be added to modeling results to obtain total pollutant concentrations at an analysis site.

The background concentrations used in the mobile source analysis are based on concentrations recorded at a monitoring station representative of the county or from the nearest available monitoring station and in the statistical form of the NAAQS, as provided

[9] DEC has stated that upper air measurements for 2022 are missing a significant number of days, consequently 2022 meteorological data is not being considered.

[10] DEC staff previously communicated in an email to AKRF that the met data provided by DEC and processed with earlier versions is acceptable for use with later AERMOD versions. DEC does not have immediate plans to update the met data using AERMET Version 24142.

in the *CEQR Technical Manual*. The background concentrations are presented in **Table 15-3**.

$PM_{2.5}$ and CO concentrations were based on three recent years of monitored data (2017–2019)[11] consistent with the statistical format of the NAAQS. To develop background levels for each pollutant, concentrations measured at the most representative ambient monitoring station operated by DEC over a three-year period were used consistent with DEC guidance. 2020 and 2021 data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, consistent with DEP guidance.

Table 15-3
Maximum Background Pollutant Concentrations for Mobile Source Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
CO	1-hour	CCNY	2.52 ppm	35 ppm
	8-hour	CCNY	1.2 ppm	9 ppm
$PM_{2.5}$	24-hour	JHS 126	17.8 µg/m^3	35 µg/m^3 (2)
	Annual	JHS 126	7.6 µg/m^3	9 µg/m^3

Notes:
(1) CO concentrations represent the maximum second-highest monitored concentrations from the three years of data.
(2) PM2.5 24-hour-average concentration represents the average of the 98th percentile day from three recent years of data.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017-2019.

Analysis Sites

Intersections in the study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. ~~Four~~ Five intersections were selected for microscale analysis (see **Table 15-4** and **Figure 15-1**). These sites were selected because they are the locations in the study area projected to have the highest levels of project-generated traffic, and, therefore, where the greatest air quality impacts and maximum changes in concentrations would be expected. The potential impact from vehicle emissions of $PM_{2.5}$ was analyzed for each of these intersections, while CO concentrations were modeled at ~~two~~ three of the intersections.

Table 15-4
Mobile Source Analysis Sites

Analysis Site	Location	Pollutants
1	Vernon Boulevard and 44th Drive	CO, $PM_{2.5}$
2	Vernon Boulevard and 46th Avenue	CO, $PM_{2.5}$
3	44th Drive and 11th Street	$PM_{2.5}$
4	21st Street and Queens Plaza South	$PM_{2.5}$
5	Vernon Boulevard and 48th Avenue	CO, $PM_{2.5}$

[11] The 2020 and 2021 background data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, based on available guidance from DEP.



Primary Study Area (Project Area)

Pollutants

- *CO and $PM_{2.5}$*
- *$PM_{2.5}$*

Air Quality Analysis Intersections

As described earlier, additional modeling was performed between the Draft and Final EIS using a grid analysis to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from the Proposed Project's mobile sources for the 2035 analysis year. Two grids were analyzed: Grid 1 was centered on Sites 1, 2 and 3 and also covers portions of Vernon Boulevard to the south, including Site 5 (see **Figure 15-2**); and Grid 2 was centered on Site 4 (see **Figure 15-3**).

Receptor Placement

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected sites. Receptors were placed along the approach and departure links and roadway segments at regularly spaced intervals. Ground-level receptors were placed at sidewalk or roadside locations near intersections with continuous public access, at a pedestrian height of 1.8 meters. Based on the DEP guidance for neighborhood-scale corridor $PM_{2.5}$ modeling, receptors in that analysis were placed at a distance of 15 meters, from the nearest moving lane at each analysis location.

For the grid analysis, receptors were placed at a pedestrian height of 6 feet on a grid, with receptors placed at a 25-meter spacing along each of the corridors to be analyzed.

PARKING ANALYSIS

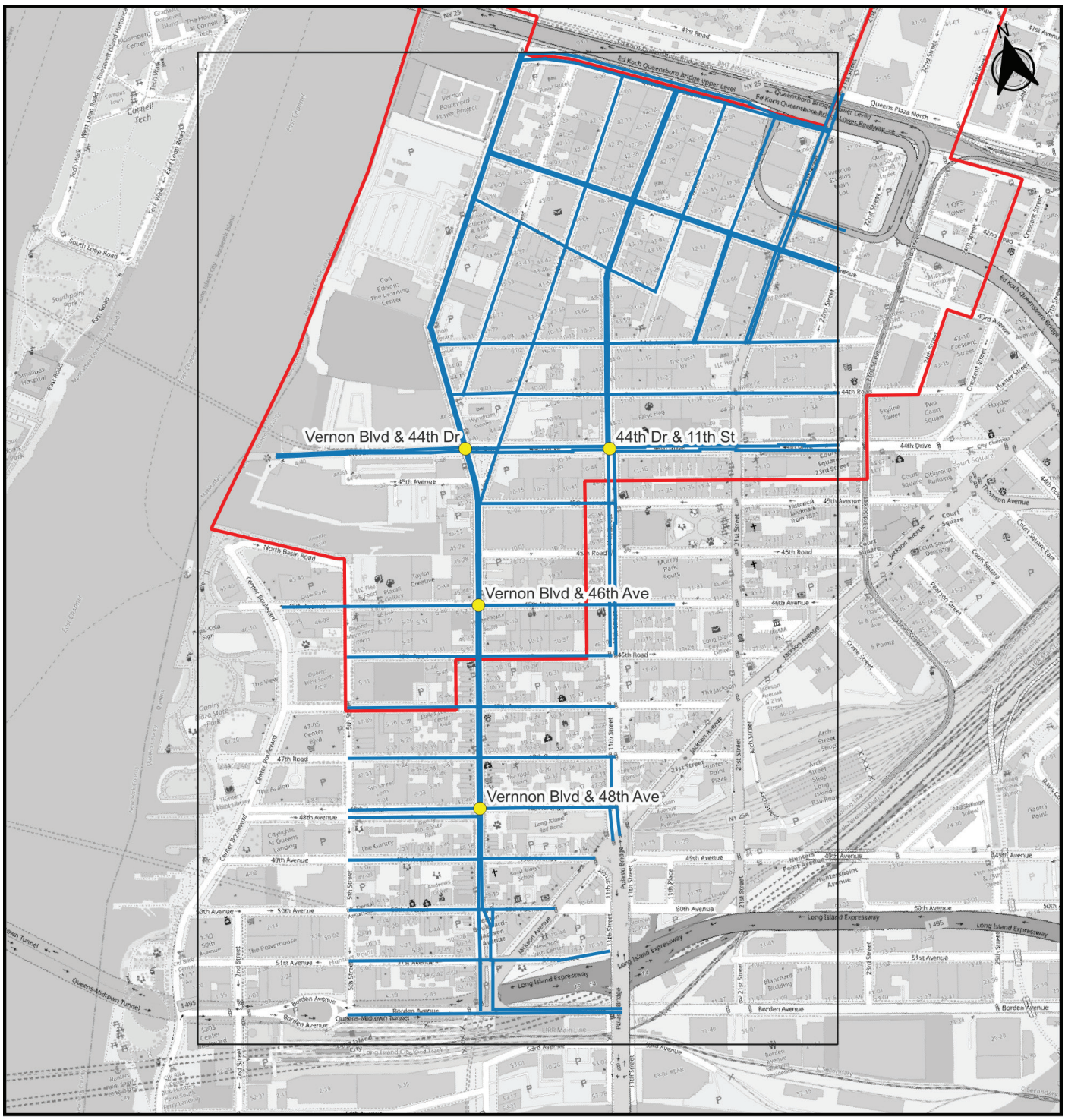
The Proposed Actions would include parking facilities to account for the new parking demand and supply. Emissions from vehicles using the parking areas could potentially affect ambient levels of CO and $PM_{2.5}$ in the immediate vicinity in the With Action condition. Of the parking associated with the projected development sites, the prototypical parking garages at Projected Development Sites 63 (801 spaces) and 69 (546 spaces) were analyzed. These sites were analyzed since they have the maximum overall capacity and the maximum predicted number of vehicle ins/outs, and therefore, the highest potential incremental concentrations of pollutants. In addition, the parking facilities for Projected Development Sites 67 (246 spaces) was selected for analysis due to its proximity to Site 69, to assess potential the potential cumulative effects of these parking facilities.

An analysis of the emissions from the outlet vents and their dispersion in the environment was performed, calculating pollutant levels in the surrounding area, using the methodology set forth in the *CEQR Technical Manual*.

Emissions from vehicles entering, parking, and exiting the garages were estimated using the EPA MOVES5 mobile source emission model, as described in detail above for the analysis of emissions at intersections. For all arriving and departing vehicles, an average speed of five miles per hour was conservatively assumed for travel within the parking garages. In addition, all departing vehicles were assumed to idle for one minute before proceeding to the exit. The concentrations of CO and PM within the garages were calculated assuming a minimum ventilation rate of one cubic foot per minute of fresh air per gross square foot of garage area, as referenced in the *CEQR Technical Manual*. To determine compliance with the NAAQS, CO concentrations were determined for the maximum eight-hour average period. (No exceedances of the one-hour standard would occur, and the eight-hour values are the most critical for impact assessment.)

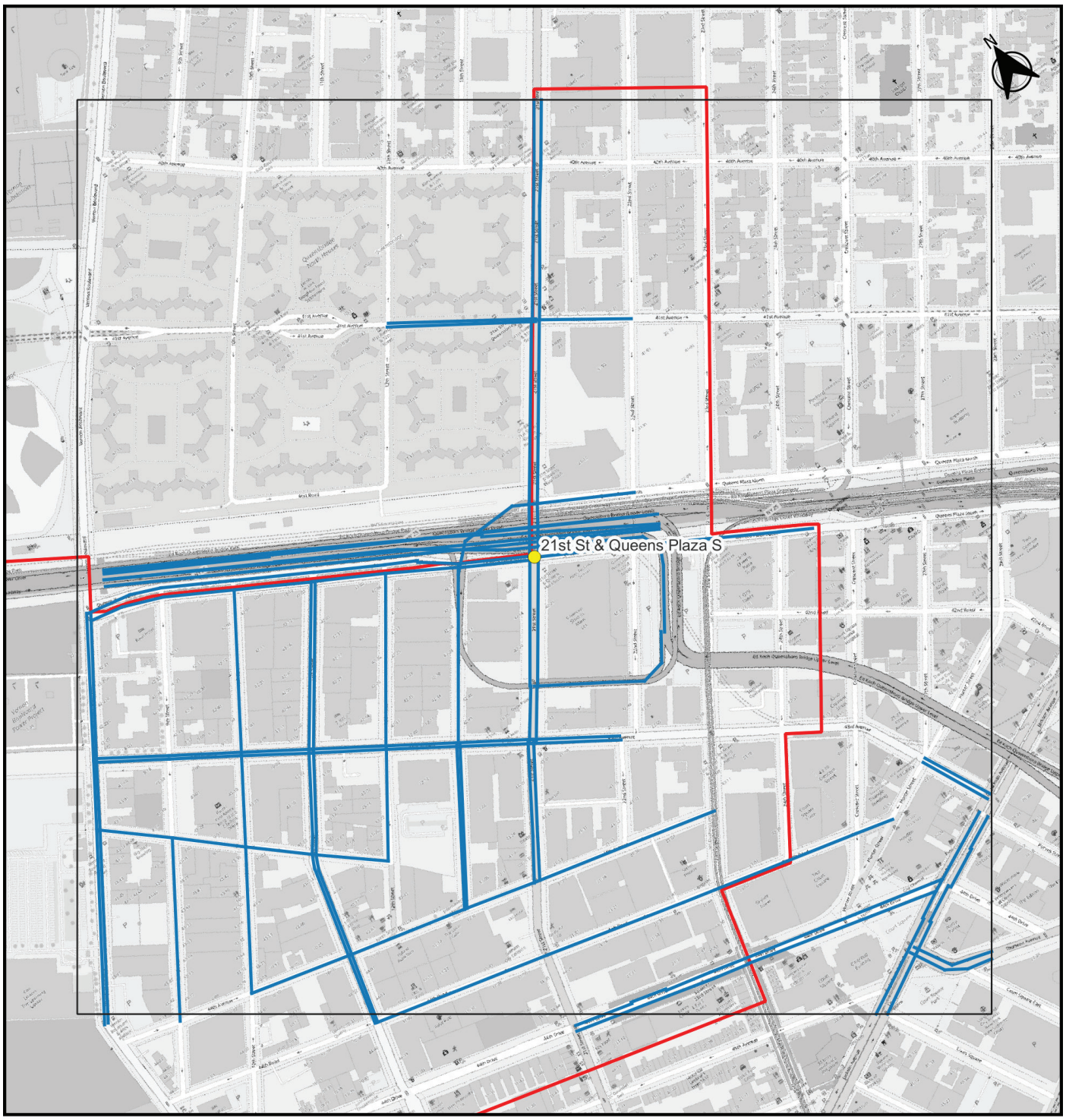
To determine pollutant concentrations, the outlet vents were analyzed as a "virtual point source" using the methodology in EPA's Workbook of Atmospheric Dispersion Estimates,

8.6.25



Roadways for Grid Analysis - Grid 1

8.6.25



Roadways for Grid Analysis - Grid 2

AP-26. This methodology estimates CO and PM concentrations at various distances from an outlet vent by assuming that the concentration in the garage is equal to the concentration leaving the vent, and determining the appropriate initial horizontal and vertical dispersion coefficients at the vent faces.

CO concentrations were determined for the time periods when overall garage usage would be the greatest, considering the hours when the greatest number of vehicles would exit the facility. PM concentrations were determined peak daily (24-hour) use. Traffic data for the parking garage analysis was derived from the trip generation analysis described in the Transportation Chapter of this DEIS.

A persistence factor of 0.70 was used to convert the maximum 1-hour average CO concentrations to 8–hour averages, per *CEQR Technical Manual* guidance, and factors of 0.6 and 0.1 to convert maximum 1-hour $PM_{2.5}$ concentrations to 24-hour and annual averages, respectively, per EPA guidance,[12] accounting for meteorological variability over the longer averaging periods. To determine compliance with the NAAQS, CO concentrations were determined for the maximum 8-hour average period.

Background and on-street concentrations were added to the modeling results to obtain the total ambient levels for CO. The 24-hour average $PM_{2.5}$ background concentration was used to determine the *de minimis* criteria threshold.

ANALYSIS OF ELEVATED ROADWAY

Projected Development Sites 20, 43, 46, 49 and 51 and Potential Development Site K are within 200 feet of the Ed Koch Queensborough Bridge and associated ramps. The effect of these existing elevated roadways on these future development sites was therefore analyzed, as recommended in the *CEQR Technical Manual*.

Emission factors for CO and $PM_{2.5}$ were determined using the EPA MOVES5 model, using estimated speeds and volumes from information developed for the traffic analysis for the Proposed Actions) and vehicle classification from the Traffic Information Management System (TIMS) developed by the New York City Department of Transportation (DOT), and/or data maintained by ~~the New York State Department of Transportation (~~NYSDOT~~)~~, was used to supplement any gaps in traffic.[13] Receptors were placed at various locations and elevations to predict concentrations from vehicles on each of the projected and potential development sites within 200 feet of the bridge that would include residential uses.

STATIONARY SOURCES

A stationary source analysis was conducted to evaluate potential impacts from the projected and potential development sites' heat and hot water systems. In addition, an assessment was conducted to determine the potential for impacts due to industrial activities within the affected area, and from any nearby large or major emission sources.

[12] EPA. *AERSCREEN User's Guide*. EPA-454/B-21-005. April 2021.

[13] The ratio between passenger cars and passenger trucks calculated from the county-specific vehicle population data used in the DEC inventory projections for 2020 will be applied as an additional breakdown of the fraction coded as autos in the data published by NYSDOT.

INDIVIDUAL HEAT AND HOT WATER SYSTEMS

Screening Analysis

A screening analysis was performed to assess air quality impacts associated with emissions from heat and hot water systems for each projected and potential development site. The methodology described in the *CEQR Technical Manual* was used for the analysis, and considered impacts on sensitive uses (i.e., existing residences and proposed developments). For the purpose of evaluating potential air quality impacts associated with the reasonable worst-case development scenario, it was conservatively assumed that each of the projected and potential development sites would utilize fossil fuel-fired heating and/or hot water systems.

The methodology determines the threshold of development size below which the action would not have a significant adverse impact. The screening procedures utilize information regarding the type of fuel to be used, the maximum development size, and the heat and hot water systems' exhaust stack height, to evaluate whether a significant adverse impact may occur. Based on the distance from the development site to the nearest building of similar or greater height, if the maximum development size is greater than the threshold size shown in the *CEQR Technical Manual*, there is the potential for significant air quality impacts, and a refined dispersion modeling analysis would be required. Otherwise, the source passes the screening analysis, and no further analysis is required.

Since information on the heat and hot water systems' design was not available, each projected and potential development site was evaluated with the nearest existing (project-on-existing) or proposed development (project-on-project) of a similar or greater height analyzed as a potential receptor. The maximum gross floor area of each projected and potential development site from the Reasonable Worst-Case Development Scenario (RWCDS) was used as input for the screening analysis.

It was assumed that No. 2 fuel oil or natural gas would be used in the projected and potential development sites' heat and hot water systems, and that the exhaust stack(s) would be located three feet above roof height (the default assumption in the *CEQR Technical Manual*), 10 feet from the edge of the roof. Also, for development sites that are assumed to contain multiple buildings served by a single heating and hot water system, the screening analysis was performed for each building. If the results pass the screening analysis, assuming No. 2 fuel and natural gas, the proposed development site is determined to result in no potential significant adverse air quality impacts using No. 2 fuel oil or natural gas. If the results did not pass the screening analysis assuming No. 2 fuel but pass the screening analysis assuming natural gas, the proposed development site is determined to result in no potential significant adverse air quality impacts using natural gas, and an E-Designation was placed prohibiting the use of No. 2 fuel oil. If the screening analysis using natural gas does not pass, an additional stack setback was screened, at the center of the roof. If the results passed the screening analysis, the proposed development site was determined to result in no potential significant adverse air quality impacts using natural gas, and an E-Designation would be placed prohibiting the use of No. 2 fuel oil and requiring a minimum stack setback to the stack location used in the screening analysis.

Refined Dispersion Analysis

For sources that did not pass the screening analyses using the *CEQR Technical Manual* procedures, a refined modeling analysis was performed. For natural gas, the primary pollutants of concern are NO_2 and $PM_{2.5}$.

Projected and potential development sites that did not pass the simple screening analysis were further analyzed using a refined dispersion model, the EPA/AMS AERMOD dispersion model. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. AERMOD is EPA's preferred regulatory stationary source model.

The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analyses of potential impacts from exhaust stacks were made assuming stack tip downwash, urban dispersion and surface roughness length, and elimination of calms. AERMOD can be run with and without building downwash (the downwash option accounts for the effects on plume dispersion created by the structure the stack is located on, and other nearby structures). In general, modeling "without" building downwash produces higher estimates of pollutant concentrations when assessing the impact of elevated sources on elevated receptor locations. Therefore, since the AERMOD analysis was performed to evaluate potential project-on-project and project-on-existing air quality impacts, the analysis was performed using the AERMOD model with the no downwash option only.

For the refined analysis, the exhaust stacks for the heat and hot water systems were assumed to be located at the edge of the development massing closest to the receptor, at an initial distance of 10 feet or greater from the nearest receptor. This included a minimum distance of 10 feet from the edge of the roof of the building where the stack was assumed to be located.

The refined dispersion modeling analysis was performed for $PM_{2.5}$ and NO_2. The analysis was performed using calculated emission rates for natural gas. If a source could not meet the NAAQS or $PM_{2.5}$ *de minimis* criteria using the initial heating and hot water system stack assumptions, further restrictive measures were considered, including setting the stack back to the center of the roof, use of low NO_x burners, increasing stack height, or a combination of these measures.

Emission Estimates and Stack Parameters

Fuel consumption was estimated based on the procedure outlined in the *CEQR Technical Manual*. Using information in the Air Quality Appendix of the *CEQR Technical Manual*, an estimate of the emissions from the development's heating and hot water systems was made. The appendix includes tables which were used to estimate emissions based on the development size, type of fuel used and type of construction. A natural gas fuel consumption factor of 47.8 ft^3/ft^2-year and 36.1 ft^3/ft^2-year was used for residential and

commercial developments, respectively. Mixed-use developments used the residential fuel consumption factors since they are more conservative. Short-term factors were determined by estimating peak hourly fuel consumption estimates for heating and cooling systems assuming that the calculated annual fuel consumption occurs over a 100-day heating season.

Emission factors from the natural gas combustion section of EPA's ~~AP-42~~ *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*, were used to calculate emission rates for the projected and potential development sites' heat and hot water systems.

One-hour average NO_2 concentration increments associated with the projected and potential development sites' hot water systems were estimated using AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. The model applied ozone concentrations measured in 2015–2019 at the DEC Queens College monitoring station, which is the nearest ozone monitoring station to the rezoning area.[14] An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed, which is considered representative for boilers.

The methodology used to determine the compliance of total one-hour NO_2 concentrations from the proposed sources with the one-hour NO_2 NAAQS was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from proposed sources were first added to the seasonal hourly background monitored concentrations; then the highest combined daily one-hour NO_2 concentration was determined at each receptor location and the 98th percentile daily one-hour maximum concentration for each modeled year was calculated within the AERMOD model; finally, the 98th percentile concentrations were averaged over the latest five years. This methodology is referenced in EPA modeling guidance[15] and is recognized by the City.

Annual NO_2 concentrations from heating and hot water sources were estimated using the Tier 1 method, which conservatively assumes a full conversion of NO_2 to NO_x.[16]

Background Concentrations

To estimate the maximum expected pollutant concentration at a given location (receptor), the predicted impacts must be added to a background value that accounts for existing pollutant concentrations from other sources that are not directly accounted for in the model (see **Table 15-5**). To develop background levels, concentrations measured at the most representative DEC ambient monitoring station a recent 3-year period (2017–2019) were used for annual and 1-hour average NO_2 background concentrations. The 2020 and 2021

[14] 2020 and 2021 background data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, consistent with DEP guidance. 2022 and 2023 background data were not used since it needs to be paired with 2022/2023 meteorological data, which DEC has stated is missing a significant number of days of upper air measurements. Consequently, this data is not available for use in modeling analyses.

[15] Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard, EPA, March 1, 2011.

[16] Appendix W to Part 51, *Guideline on Air Quality Models*, Section 4.2.3.4.

background data were not used because of uncertainties in the representativeness of background concentrations for these years due to effects of COVID-19, based on available guidance from DEP.

Table 15-5
Maximum Background Pollutant Concentrations

Pollutant	Average Period	Location	Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-hour	IS 52	110.6	188
	Annual	IS 52	32.8	100
$PM_{2.5}$	24-hour	JHS 126	17.8	35
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2017–2019.				

$PM_{2.5}$ annual average impacts are assessed on an incremental basis and compared with the $PM_{2.5}$ *de minimis* criteria, without considering the annual background. Therefore, the annual $PM_{2.5}$ background is not presented in the table. The $PM_{2.5}$ 24-hour average background concentration of 17.6 µg/m^3 (based on the 2017 to 2019 average of 98th percentile concentrations measured at the Queens College monitoring station) was used to establish the *de minimis* value for the 24-hour increment, consistent with the guidance provided in the *CEQR Technical Manual*.

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at the LaGuardia Airport NWS Station (2015–2019), and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the five-year period. These data were processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

Receptor Placement

Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the existing and proposed building façades to represent potentially sensitive locations such as operable windows and intake vents. Receptors were placed at elevated locations on all façades and at multiple elevations on buildings, to identify maximum pollutant concentrations. Generally, receptors would be spaced at a three-meter (approximately 10 feet) interval vertically to represent individual floors of a building, while horizontally, receptor spacing would be a minimum of three meters and a maximum of 10 meters (approximately 33 feet).

CUMULATIVE IMPACTS FROM HEAT AND HOT WATER SYSTEMS

In addition to the individual source analysis, groups or “clusters” of heat and hot water sources with similar stack heights were analyzed, to address the cumulative impacts of multiple sources. The rezoning area and RWCDS were reviewed to determine areas where clusters with high density of development sites with similar building heights would be located which could result in cumulative impacts on nearby buildings of a similar or greater height. A total of three clusters were selected for analysis. The development sites

associated with each cluster and their location are presented in **Table 15-6** and **Figure 15-4~~15-2~~**.

Table 15-6
Cluster Analysis Sites

Cluster	Development Sites
1	4, 9, A, B, C
2	25, E, N
3	29, 30, 31, 32, F

The heating and hot water system cluster analysis was performed using the EPA AERMOD Model, following the same general procedures outlined above for the individual development sites.

The analysis for the clusters was performed assuming natural gas as the fuel type. Using information in the Air Quality Appendix of the *CEQR Technical Manual*, an estimate of the emissions from the cluster development's heat and hot water systems was made. The appendix includes tables that can be used to estimate emissions based on the development size, type of fuel used and type of construction. Fuel consumption factors of 47.8 ft^3/ft^2-year and 36.1 ft^3/ft^2-year were used for residential developments and commercial developments, respectively. Mixed-use developments used the residential fuel consumption factors since it is more conservative. Short-term factors were determined by using peak hourly fuel consumption estimates for heating and cooling systems. Emission factors for each fuel were obtained from the EPA ~~*Compilation of Air Pollutant Emission Factors,*~~ AP-42~~*, Fifth Edition, Volume I: Stationary Point and Area Sources*~~.

For this analysis, buildings within the cluster were modeled individually since the AERMOD model is capable of modeling multiple sources of emissions. The analysis focused on existing buildings or other projected and potential development sites that are of a similar or greater height than the source cluster.

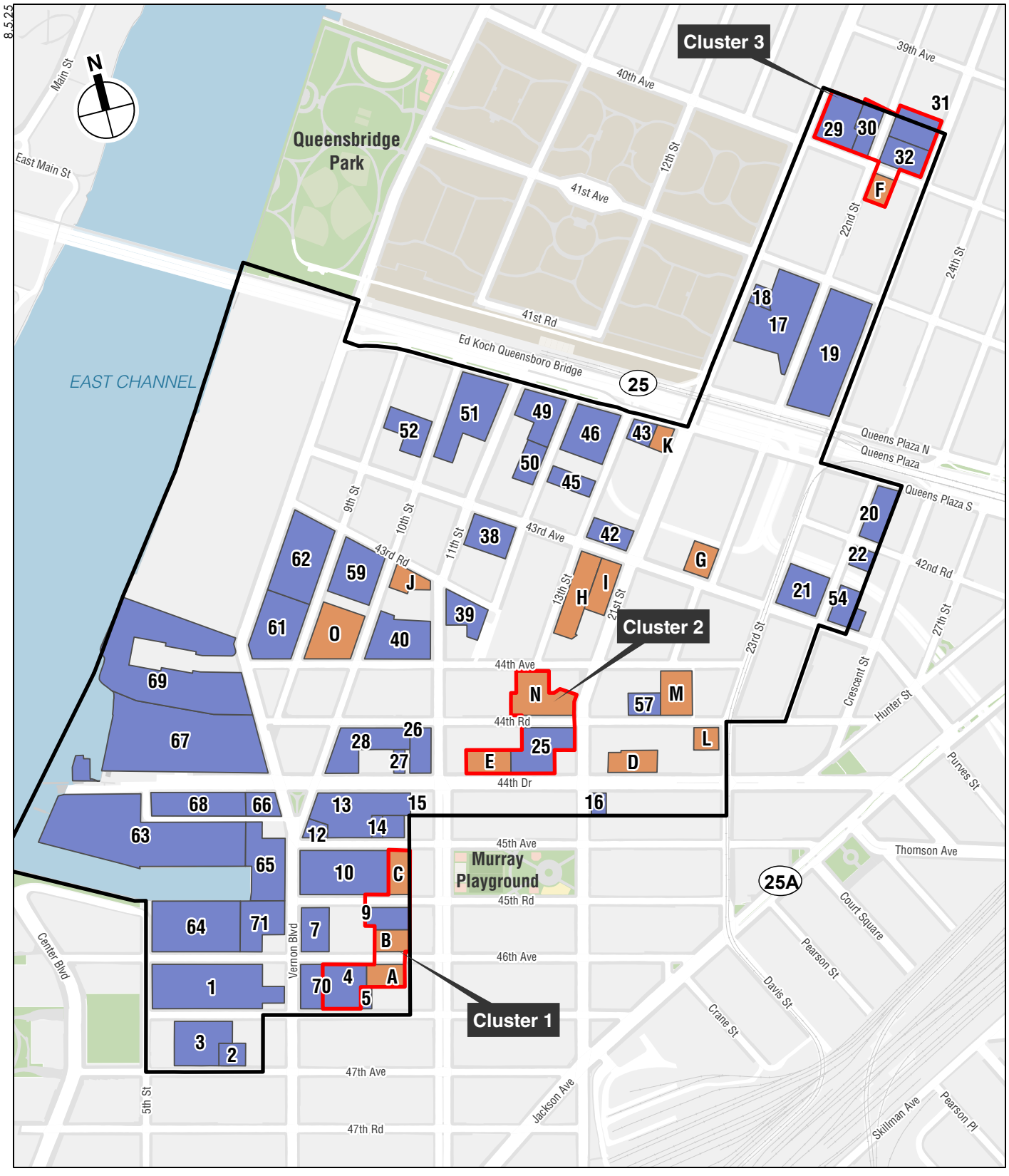
To estimate the maximum expected pollutant concentration at a given receptor, the calculated impact must be added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 15-5**).

INDUSTRIAL SOURCES

Analysis of Potential Impacts from Existing Uses

Pollutants emitted from existing sources were examined to identify potential adverse impacts on future residents of the projected and potential development sites. All industrial air pollutant emission sources within 400 feet of a projected and potential development site boundary were considered for inclusion in the air quality impact analyses.

A request was made to DEP's Bureau of Environmental Compliance (BEC) for information regarding the release of air pollutants from these potential sources within the entire study area. A comprehensive search was also performed to identify DEC Title V and State Facility permits. The DEP and DEC air permit data provided was compiled into a database of source locations, air emission rates, and other data pertinent to determining source impacts.



Potential Clusters

LONG ISLAND CITY NEIGHBORHOOD PLAN

Figure 15-4

A field survey was conducted on November 20 and December 12, 2024, to determine the operating status of permitted industries and identify any potential industrial sites not included in the original permit request or the permit databases. Overall, 33 DEP permitted and 8 DEC registered sources were identified and determined to be currently in operation, at a total of 22 facilities (eight facilities contained both a DEP permit and a DEC registration and 8 of the facilities had multiple DEP permits). In addition, 16 unpermitted sources were identified, mainly autobody shops that appeared to perform spray coating of automobile parts. These facilities are summarized in **Table 15-7**.

Table 15-7
Industrial Sources within 400 Feet of a Projected or Potential Development Site

Name of Business	Address	Type of Business	Permit ID
DEP Permitted Sources			
21st Street Auto Repair Inc.	43-44 21st Street	Autobody Paint Spray Booth	PA008798
Manhattan Cabinetry, Inc.	9-03 44th Road	Woodworking Paint Spray Booth	PA031987
Manhattan Cabinetry, Inc.	9-03 44th Road	Woodworking	PA032087
Sadowsky Guitars LTD	21-07 41st Avenue	Woodworking	PB009515(1)
Sadowsky Guitars LTD	21-07 41st Avenue	Paint Spray Booth	PB008211(1)
Sufi Auto Repair & Body Shop (Current Businss is Hybrid Auto)	13-11 44th Avenue	Autobody Paint Spray Booth	PB009712
Trieste Corporation	43-22 12th Street	Paint Spray Booth	PB020009
Trieste Corporation	43-22 12th Street	Woodworking	PB033312
Cabinet Design LLC	40-24 22nd Street	Woodworking	PB020414(1)
Cabinet Design LLC	40-24 22nd Street	Woodworking Spray Booth	PA046281(1)
Segundo's Auto Repair Inc.	38-38 22nd Street	Autobody Paint Spray Booth	PB032310
Queens Medallion Leasing, Inc.	21-03 44th Avenue	Autobody Paint Spray Booth	PB032608(1)
Gotham City Collision	11-30 44th Road	Autobody Paint Spray Booth	PB033012
Laumont Photographics	44-01 21st Street	Paint Spray Booth	PB034708
Formula 1 Auto Collision Inc./A-1 Auto Repair & Body Work, Inc.	40-24- 23rd Street	Autobody Paint Spray Booth	PB039005
Giovanni's Imports	11-48 44th Drive	Autobody Paint Spray Booth	PB471903(1)
Giovanni's Imports	11-48 44th Drive	Tailpipe Exhaust Emissions	PA018291(1)
Thomas C. Wilson LLC	21-11 44th Avenue	Manufacturing of Air Motors	PA071873
Thomas C. Wilson LLC	21-11 44 Avenue	Motor Testing	PB014506
Argo Envelope	43-10 21st Street	Printing	PW013021(1)
Neka Auto Repair	23-03 40th Avenue	Autobody Paint Spray Booth	PW006418
Fong Creative Corp	40-24 22nd Street	Woodworking Spray Booth	PB053505
Fong Creative Corp	40-24 22nd Street	Woodworking	PB053405
DEC Registered Facilities			
Argo Envelope	43-10 21st Street	Printing	2-6304-00321/00007(1)
Designs for Cabinets LLC	40-24 22nd Street	Woodworking Spray Booth	2-6304-00344/00003(1)
Giovanni's Imports	11-48 44th Drive	Paint Spray Booth	2-6304-01078/00002(1)
Queens Medallion Leasing, Inc.	21-03 44th Avenue	Autobody Paint Spray Booth	2-6304-01627/00001(1)
Sadowsky Guitars LTD	21-07 41st Avenue	Paint Spray Booth	2-6304-01677/00001(1)

Table 15-7 (cont'd)
Industrial Sources within 400 Feet of a Projected or Potential Development Site

Name of Business	Address	Type of Business	Permit ID
Unpermitted Sources			
Empire City Ironworks	10-37-46th Road	Iron Works	NA
City Auto Service	39-01 21st Street	Autobody Paint Spray Booth	NA
Star Auto	40-11 23rd Street	Autobody Paint Spray Booth	NA
American Lease Repair	40-28 23rd St	Autobody Paint Spray Booth	NA
Star Auto	40-30 23rd St	Autobody Paint Spray Booth	NA
Sufi Auto	22-05 43rd Avenue	Autobody Paint Spray Booth	NA
Cosmos Communications LIC	43-01 22nd Street	Printing	NA
Stylish Print & Design Gallery	21-16 43 Ave	Printing	NA
Heera Auto Body Inc.	44-07 Vernon Boulevard	Autobody Paint Spray Booth	NA
4 Brothers Printz	40-24 22nd Street	Printing	NA
CJ Ink Co., Inc.	40-24 22nd Street	Printing	NA

Notes:
NA – Not Applicable
(1) The business has a DEP permit and a DEC registration.

One or more industrial sources were found at Potential Development Site I. To be conservative, for this site, which may not be developed by the Proposed Action's Build Year, the industrial analysis was performed two ways, as follows:

- Assuming the site is developed, in which case the industrial source(s) is not assumed to be operating in the With Action condition. In this case, potential air quality impacts from other industrial sources in the study area were studied to evaluate their potential effects on the development site.
- Assuming the site is not developed, in which case the industrial source(s) is assumed to be operating in the With Action condition, and its potential effects on other projected and potential development sites were determined.

In most cases, sources that perform automotive paint spraying did not include the solvent emissions as individual air toxic compounds in the air permit or registration. For these sources, representative information for a permitted automotive paint spraying operation that lists individual air toxic compounds was used as a basis to estimate their speciated solvent emissions.[17] The solvent usage from the source permits were multiplied by the weight percentage for each air toxic to estimate the maximum emission rate for the air toxics, by source.

Table 15-8 summarizes weight percentages of VOCs for representative automotive coatings. For short-term modeling, the highest weight percentage associated with each VOC was used, to be conservative. For annual average modeling, a prorated emission rate of each VOC was determined based on the reported quantities of each product used in the example air permit and the weight percentage for VOC in each product.

Percentages by weight of solids found in representative auto spray primers and paints were utilized. Based on particle size information provided in EPA AP-42, PM_{10} accounts for the largest percentage of the solids' emissions (up to 46.7 percent), while $PM_{2.5}$

[17] DEP Permit ID PW000319.

accounts for 28.6 percent of the paints and primers.[18] The proportion of a solid in a paint by weight is representative of its proportion in the emissions.

Solvent usage was obtained from the permit data. Solvent usage was multiplied by the weight percentage for each air toxic to estimate the maximum emission rate for each air toxic. If solvent usage is not available, a solvent usage based on the typical usage found at the permitted facilities was used. This representative solvent usage as well as the weight percentages of the air toxics was also used to estimate emissions at facilities that do not possess either a DEP permit or DEC registration and were determined to perform auto-body related spray coating.

For the other unpermitted sources, solvent usage was estimated based on the usage rates for similar sized business (based on the number of service bays) for which permit data was available. This resulted in an assumed coating application rate of 0.125 gallons per hour (gal/hr). However, to be conservative, solids emissions were estimated assuming a maximum coating application rate of 0.5 gal/hr.

The pollutants and emission rates for each permitted facility are presented in **Table 15-9a** DEP permitted sources. **Table 15-9b** presents the pollutants and emission rates for DEC registered and unpermitted facilities.

[18] EPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I: Stationary Point and Area Sources, Appendix B-1, Table 4.2.2.8: Particle Size Distribution Data and Sized Emission Factors for Selected Sources. http://www.epa.gov/ttn/chief/ap42. October 1986.

Table 15-8

Typical Composition of VOC Emissions from Auto Spray Paint Booths

Chemical Name	CAS #	Paint % by Weight				
		Acrylic Lacquer Thinner	Reactive Reducer	Hi-Performance Clear	Blue Shade Violet	Velocity Premium Clearcoat
Toluene	108-88-3	12%	20%	50%	5%	--
Xylenes	1330-20-7	7.4%	--	--	--	31%
Ethylbenzene	100-41-4	1.3%	--	--	--	5.6%
Acetone	67-64-1	45%	50%	--	--	10%
2-Methoxy-1-methylethyl Acetate	108-65-6	10%	5%	--	--	10%
Methylcyclohexane	108-87-2	4.8%	10%	--	--	--
Heptane	142-82-5	20%	10%	--	--	--
Isobutyl Acetate	110-19-0	10%	--	--	--	--
Isopropyl Alcohol	67-63-0	5%	--	--	--	--
n-Butyl acetate	123-86-4	--	5%	--	50%	--
Butanone	78-93-3	--	50%	20%	--	--
Ethyl 3-ethoxyproprionate	763-69-9	--	5%	10%	--	--
Solvent Naphtha	64742-89-9	--	10%	--	--	--
Benyzl butyl phthalate	85-68-7	--	--	10%	--	--
2-(2H-benzotriazzol-2-yl)-4,6-bitertpentylphenol	25973-55-1	--	--	5%	--	--
Ligroine	8032-32-4	--	--	--	5%	--
Xylene	1330-20-7	--	--	--	--	33%
4-Methylpentan-2-one	108-10-1	--	--	--	--	7.8%
Heptan-2-one	110-43-0	--	--	--	--	3%

Source: DEP Permit PW000319 and associated Safety Data Sheets.

Table 15-9a
Modeled Emission Rates of Existing Industrial Sources
DEP Permitted Sources

Facility	Description of Process	DEP Permit ID	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
21st Street Auto Repair Inc.	Autobody Paint Spray Booth	PA008798	Solids	NY079-00-0	0.033	48.8
			PM10	NY075-00-0	0.015	22.79
			PM2.5	NY075-02-5	0.0094	13.96
			Solvents	NY998-00-0	3.1	4,650
			Toluene	108-88-3	1.55	501.12
			Xylenes	1330-20-7	0.96	150.09
			Ethylbenzene	100-41-4	0.17	26.69
			Acetone	67-64-1	1.55	737.54
			2-Methoxy-1-methylethyl acetate	108-65-6	0.31	156.29
			Methylcyclohexane	108-87-2	0.31	94.55
			Heptane	142-82-5	0.62	271.25
			Isobutyl Acetate	110-19-0	0.31	116.25
			Isopropyl Alcohol	67-63-0	0.155	58.125
			n-butyl acetate	123-86-4	1.55	1311.04
			Butanone	78-93-3	1.55	255.75
			Ethyl 3-Ethoxypropionate	763-69-9	0.31	50.38
			Solvent Naptha	64742-89-8	0.31	38.75
			Benzyl butyl phthalate	85-68-7	0.31	31
			2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol	25973-55-1	0.16	15.5
			Ligroine	8032-32-4	0.16	3.1
			4-methylpentan-2-one	108-10-1	0.24	16.12
			heptan-2-one	110-43-0	0.084	5.58
Manhattan Cabinetry, Inc.	Woodworking Paint Spray Booth	PA031987	Pigment	NY075-00-0	0.0083	50
			Xylene	1330-20-7	0.98	1955
			Ethyl Benzene	100-41-4	0.14	275
			N-Butyl Alcohol	71-36-3	0.15	305
			Isobutyl Alcohol	78-83-1	0.03	60
			Formaldehyde	50-00-0	0.03	60
			Dibutyl Phthalate	84-74-2	0.085	170
Manhattan Cabinetry, Inc.	Wood-working	PA032087	Wood Fines	NY075-00-0	0.0033	16
Sadowsky Guitars LTD	Wood-working	PB009515	Total Particulates	NY079-00-0	0.00017	8
Sadowsky Guitars LTD	Paint Spray Booth	PB008211	Solids	NY075-00-0	0.026	160
			Toluene	108-88-3	2.3	4,600
			Isobutyl Acetate	110-19-0	0.2	400
			MEK	78-93-3	0.4	800

Table 15-9a (cont'd)
Modeled Emission Rates of Existing Industrial Sources
DEP Permitted Sources

Facility	Description of Process	DEP Permit ID	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Sufi Auto Repair & Body Shop (Current Businss is Hybrid Auto)	Autobody Paint Spray Booth	PB009712	Solids	NY079-00-0	0.0043	23.4
			PM10	NY075-00-0	0.0020	10.93
			PM2.5	NY075-02-5	0.0012	6.69
			Solvents	NY998-00-0	0.124	223.2
			Toluene	108-88-3	0.062	24.056
			Xylenes	1330-20-7	0.038	7.20
			Ethylbenzene	100-41-4	0.0069	1.28
			Acetone	67-64-1	0.062	35.40
			2-Methoxy-1-methylethyl acetate	108-65-6	0.012	7.50
			Methylcyclohexane	108-87-2	0.012	4.54
			Heptane	142-82-5	0.025	13.02
			Isobutyl Acetate	110-19-0	0.012	5.58
			Isopropyl Alcohol	67-63-0	0.0062	2.79
			n-butyl acetate	123-86-4	0.062	62.93
			Butanone	78-93-3	0.062	12.28
			Ethyl 3-Ethoxypropionate	763-69-9	0.012	2.42
			Solvent Naptha	64742-89-8	0.012	1.86
			Benzyl butyl phthalate	85-68-7	0.012	1.49
			2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol	25973-55-1	0.0062	0.74
			Ligroine	8032-32-4	0.0062	0.149
			4-methylpentan-2-one	108-10-1	0.0097	0.77
			heptan-2-one	110-43-0	0.0033	0.268
Trieste Corporation	Paint Spray Booth	PB020009	Pigment	NY075-00-0	0.0066	32
			Normal Butyl Acetate	123-86-4	0.27	32
			Butyl Cellosolve	111-76-2	0.09	432
			MEK	78-93-3	0.59	144
			MIBK	108-10-1	0.64	944
			Xylene	1330-20-7	0.22	1,024
			Acetone	67-64-1	0.45	352
			Isopropanol	67-63-0	0.18	720
			Methanol	67-56-1	0.03	228
			DI-2-Ethylphthalate	117-81-7	0.13	48
Trieste Corporation	Wood-working	PB033312	Particulate	NY075-00-0	0.00033	0.16
Cabinet Design LLC	Wood-working	PB020414	Wood Fines	NY075-00-0	0.00033	0.16

Table 15-9a (cont'd)
Modeled Emission Rates of Existing Industrial Sources
DEP Permitted Sources

Facility	Description of Process	DEP Permit ID	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Segundo's Auto Repair Inc.	Autobody Paint Spray Booth	PB032310	Solids	NY079-00-0	0.00677	50.7
			PM_{10}	NY075-00-0	0.00316	23.68
			$PM_{2.5}$	NY075-02-5	0.0019	14.50
			Solvents	NY998-00-0	0.775	483.6
			Toluene	108-88-3	0.39	52.12
			Xylenes	1330-20-7	0.240	15.61
			Ethylbenzene	100-41-4	0.043	2.78
			Acetone	67-64-1	0.39	76.70
			2-Methoxy-1-methylethyl acetate	108-65-6	0.0775	16.25
			Methylcyclohexane	108-87-2	0.0775	9.83
			Heptane	142-82-5	0.16	28.21
			Isobutyl Acetate	110-19-0	0.0775	12.09
			Isopropyl Alcohol	67-63-0	0.039	6.05
			n-butyl acetate	123-86-4	0.39	136.35
			Butanone	78-93-3	0.39	26.61
			Ethyl 3-Ethoxypropionate	763-69-9	0.0775	5.24
			Solvent Naptha	64742-89-8	0.0775	4.03
			Benzyl butyl phthalate	85-68-7	0.0775	3.22
			2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol	25973-55-1	0.039	1.61
			Ligroine	8032-32-4	0.039	0.3224
			4-methylpentan-2-one	108-10-1	0.060	1.68
			heptan-2-one	110-43-0	0.021	0.58
Queens Medallion Leasing, Inc.	Autobody Paint Spray Booth	PB032608	Solids	NY079-00-0	0.0542	97.6
			PM_{10}	NY075-00-0	0.025	45.58
			$PM_{2.5}$	NY075-02-5	0.0155	27.91
			Solvents	NY998-00-0	3.1	4650
			Toluene	108-88-3	1.55	501.17
			Xylenes	1330-20-7	0.961	150.01
			Ethylbenzene	100-41-4	0.1736	26.69
			Acetone	67-64-1	1.55	737.54
			2-Methoxy-1-methylethyl acetate	108-65-6	0.31	156.29
			Methylcyclohexane	108-87-2	0.31	94.55
			Heptane	142-82-5	0.62	271.25
			Isobutyl Acetate	110-19-0	0.31	116.25
			Isopropyl Alcohol	67-63-0	0.155	58.13
			n-butyl acetate	123-86-4	1.55	1311.04
			Butanone	78-93-3	1.55	255.75
			Ethyl 3-Ethoxypropionate	763-69-9	0.31	50.38
			Solvent Naptha	64742-89-8	0.31	38.75
			Benzyl butyl phthalate	85-68-7	0.31	31
			2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol	25973-55-1	0.16	15.5
			Ligroine	8032-32-4	0.16	3.1
			4-methylpentan-2-one	108-10-1	0.243	16.12
			heptan-2-one	110-43-0	0.084	5.58

Table 15-9a (cont'd)
Modeled Emission Rates of Existing Industrial Sources
DEP Permitted Sources

Facility	Description of Process	DEP Permit ID	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Gotham City Collision	Autobody Paint Spray Booth	PB033012	Particulates	NY079-00-0	0.0013	6.5
			PM_{10}	NY075-00-0	0.00062	3.04
			$PM_{2.5}$	NY075-02-5	0.00038	1.86
			Solvents	NY998-00-0	0.775	620
			Toluene	108-88-3	0.39	66.82
			Xylenes	1330-20-7	0.240	20.01
			Ethylbenzene	100-41-4	0.043	3.56
			Acetone	67-64-1	0.3875	98.34
			2-Methoxy-1-methylethyl acetate	108-65-6	0.0775	20.84
			Methylcyclohexane	108-87-2	0.0775	12.61
			Heptane	142-82-5	0.155	36.17
			Isobutyl Acetate	110-19-0	0.0775	15.5
			Isopropyl Alcohol	67-63-0	0.03875	7.75
			n-butyl acetate	123-86-4	0.3875	174.81
			Butanone	78-93-3	0.3875	34.1
			Ethyl 3-Ethoxypropionate	763-69-9	0.0775	6.72
			Solvent Naptha	64742-89-8	0.0775	5.17
			Benzyl butyl phthalate	85-68-7	0.0775	4.13
			2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol	25973-55-1	0.03875	2.07
			Ligroine	8032-32-4	0.03875	0.41
			4-methylpentan-2-one	108-10-1	0.06045	2.15
			heptan-2-one	110-43-0	0.020925	0.74
Laumont Photo-graphics	Paint Spray Booth	PB034708	Solids	NY075-00-0	0.016667	100
			Toluene	108-88-3	1.94	3,880
			2-Propanol	67-63-0	0.61	1,220
			N-Butyl Acetate	123-86-4	0.61	1,220
			Amyl Acetate	628-63-7	0.61	1,220
			Misc VOC	NY990-00-0	0.23	460

Table 15-9a (cont'd)
Modeled Emission Rates of Existing Industrial Sources
DEP Permitted Sources

Facility	Description of Process	DEP Permit ID	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Formula 1 Auto Collision Inc./A-1 Auto Repair & Body Work, Inc.	Autobody Paint Spray Booth	PB039005	Particulates	NY079-00-0	0.005417	26
			PM_{10}	NY075-00-0	0.00253	12.14
			$PM_{2.5}$	NY075-02-5	0.001549	7.44
			Toluene	108-88-3	0.385826	143.65
			Xylenes	1330-20-7	0.102654	41.69
			Ethylbenzene	100-41-4	0.018227	7.42
			Acetone	67-64-1	0.600718	191.64
			2-Methoxy-1-methylethyl acetate	108-65-6	0.118756	41.34
			Methylcyclohexane	108-87-2	0.081443	24.45
			Heptane	142-82-5	0.212424	70.14
			Isobutyl Acetate	110-19-0	0.086172	30.06
			Isopropyl Alcohol	67-63-0	0.043086	15.03
			n-butyl acetate	123-86-4	0.74904	410.01
			Butanone	78-93-3	0.252144	68.92
			Ethyl 3-Ethoxypropionate	763-69-9	0.045912	14.42
			Solvent Naptha	64742-89-8	0.04008	10.02
			Benzyl butyl phthalate	85-68-7	0.025872	9.41
			2-(2H-Benzotriazol-2-yl)-4,6-ditertpentylphenol	25973-55-1	0.012936	4.70
			Ligroine	8032-32-4	0.0729	40.50
			4-methylpentan-2-one	108-10-1	0.009784	4.89
			heptan-2-one	110-43-0	0.003387	1.69

Table 15-9a (cont'd)
Modeled Emission Rates of Existing Industrial Sources
DEP Permitted Sources

Facility	Description of Process	DEP Permit ID	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Giovanni's Imports	Autobody Paint Spray Booth	PB471903	Solids	NY079-00-0	0.01625	97.6
			PM_{10}	NY075-00-0	0.007589	45.58
			$PM_{2.5}$	NY075-02-5	0.004648	27.91
			Solvents	NY998-00-0	3.1	4650
			N-Butyl Acetate	123-86-4	2.015	3022.5
			Methyl Isobutyl Ketone	108-10-1	1.395	2092.5
			Xylene	1330-20-7	0.775	1162.5
			Isopropanol	67-63-0	0.31	465
			1-butanol	71-36-3	0.155	232.5
			Ethylbenzene	100-41-4	0.31	465
			Acetone	67-64-1	0.465	697.5
			Propylene Glycol Methyl Ether Acetate	108-65-6	0.155	232.5
			Toluene	108-88-3	0.155	232.5
			Ethylene Glycol Butyl Ether	111-76-2	0.155	232.5
			Aluminum Oxide	1344-28-1	0.155	232.5
			Carbon Black	1333-86-4	0.155	232.5
			Copper Phthalocyanine	1328-53-6	0.31	465
			Titanium Dioxide	13463-67-7	0.31	465
			Nickel Oxide	1313-99-1	0.155	232.5
			Iron Oxide	1309-37-1	0.31	465
			Ethyl E-Ethoxypriopionate	763-69-9	0.155	232.5
			Copper Phthalocyanine Blue	147-14-8	0.155	232.5
			Ethyl Acetate	141-78-6	0.465	697.5
			Amorphous Precipitated Silica	112926-00-8	0.465	697.5
			Copper Phthalocyanine	68987-63-3	0.155	232.5
			Solvent Naphtha, Light Aromatic	64742-95-6	0.155	232.5
			Solvent Naphtha, Heavy Aromatic	64742-94-5	0.155	232.5
			Mineral Spirits	64742-47-8	0.155	232.5
			Naphtha, Heavy Alkylate	64741-65-7	0.155	232.5
			Iron Oxide Pigment	51274-00-1	0.31	465
			Aluminum Hydroxide	7429-90-5	0.155	232.5
			Copper Phthalocyanine	15680-42-9	0.31	465
			Copper Compound	68512-13-0	0.31	465
			Antimony Pentoxide	1314-60-9	0.155	232.5
			Bismuth Vanadium Oxide	14059-33-7	1.085	1627.5
			Titanium Dioxide	13463-67-7	0.93	1395
			Mica	12001-26-2	0.31	465
			Graphite	7782-42-5	0.31	465
			Barium Sulfate	7727-43-7	0.155	232.5
Thomas C. Wilson LLC	Manufacturing of Air Motors	PA071873	Sulfur Dioxide	7446-09-5	0.001	0.36
			Nitrogen Dioxide	NY210-00-0	0.031	60.00
			Carbon Monoxide	630-08-0	0.007	12.60
			Total Organic Compounds	NY930-00-0	0.003	4.80
			Particulate	NY075-00-0	0.210333	12.00

Table 15-9a (cont'd)
Modeled Emission Rates of Existing Industrial Sources
DEP Permitted Sources

Facility	Description of Process	DEP Permit ID	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Cabinet Designs	Woodworking Spray Booth	PA046281	Alcohol	NY580-00-0	0.3	600
			Ketones	NY645-00-0	0.5	1000
			Hydrocarbons Aromatic	NY439-00-0	0.6	1200
			Hydrocarbons Aliphatic	NY550-00-0	0.6	1200
			Nitro Cellolose	NY075-00-3	0.075	150
			Metal Oxides	NY075-00-1	0.025	50
Giovanni's Imports	Tailpipe Exhaust Emissions	PA018291	Carbon Monoxide	630-08-0	3	7500
Argo Envelope	Printing	PW013021	Isopropyl Alcohol	67-63-0	0.218	432
Neka Auto Repair	Autobody Paint Spray Booth	PW006418	Pigment	NY075-00-0	0.002	10
			VOC	NY998-00-0	1.197	960
			Xylene	1330-20-7	1	800
			Ethylbenzene	100-41-4	0.12	96
			Butanone	78-93-3	0.062	52
			Toluene	108-88-3	0.015	12
Thomas C. Wilson LLC	Motor Testing	PB014506	Petroleum Ether	8020-84-6	0	5.98
Fong Creative Corp	Wood-working Spray Booth	PB053505	Pigment	NY075-00-0	0.006667	32
Fong Creative Corp	Wood-working	PB053405	Pigment	NY075-00-0	0.000333	0.16

Notes:
(1) Emissions for particulate matter were modeled over a 24-hour averaging period
(2) Particulate matter for auto body paint spray booths assumes 28.6% of total particulate matter is $PM_{2.5}$ (EPA. Compilations of Air Pollutant Emission Factors AP-42. Appendix B-1, Table 4.2.2.8. https://www3.epa.gov/ttn/chief/ap42/appendix/appb-1.pdf. October 1986.)
(3) Particulate matter emissions from all woodworking and non-auto body paint spray booths were conservatively assumed to be $PM_{2.5}$.
(4) Since no SGC or AGC is assigned to this pollutant, it was modeled with isopropyl alcohol for evaluation purposes.

Table 15-9b
Modeled Emission Rates of Existing Industrial Sources
DEC-Registered Facilities and Unpermitted Sources

Facility	Description of Process	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Various	Auto Body Paint Spray Booth	Solids	NY097-00-0	0.024	19.5
		PM_{10}	NY075-00-0	0.011	9.1
		$PM_{2.5}$	NY075-02-5	0.0069	5.6
		Solvents	NY998-00-0	2.3	1860
		Toluene	108-88-3	1.2	200.5
		Xylenes	1330-20-7	0.16	34.4
		Ethylbenzene	100-41-4	0.30	75.7
		Acetone	67-64-1	1.16	295.0
		2-Methoxy-1-methylethyl acetate	108-65-6	0.23	59.2
		Methylcyclohexane	108-87-2	0.23	37.8
		Heptane	142-82-5	0.47	108.5
		Isobutyl Acetate	110-19-0	0.23	46.5
		Isopropyl Alcohol	67-63-0	0.12	23.3
		n-butyl acetate	123-86-4	1.16	524.4
		Butanone	78-93-3	1.16	102.3
		Ethyl 3-ethoxyproprionate	763-69-9	0.23	20.2
		Solvent Naphtha	64742-89-9	0.23	15.5
		Benyzl butyl phthalate	85-68-7	0.23	12.4
		2-(2H-benzotriazzol-2-yl)-4,6-bitertpentylphenol	25973-55-1	0.12	6.2
		Ligroine	8032-32-4	0.12	51.7
		Xylene	1330-20-7	0.77	27.3
		4-methylpentan-2-one	108-10-1	0.19	6.9
		heptan-2-one	110-43-0	0.070	2.4
Empire City Ironworks	Ironworks	1,1,2-Trichloroethane	79-00-5	0.53	53
		Dioxane	123-91-1	0.014	14
		1,2-Exoxybutane	106-88-7	0.003	0.3
		Isorpopyl Alcohol	67-63-0	0.96	48
Cosmos Communications LIC	Printing	Lead Vapors	7489-42-1	0.001	0.75
		Miscellaneous Organic Compounds	NY990-00-0	0.001	0.75
Stylish Print & Design Gallery	Printing	Lead Vapors	7489-42-1	0.001	0.75
		Miscellaneous Organic Compounds	NY990-00-0	0.001	0.75
4 Brothers Printz	Printing	Lead Vapors	7489-42-1	0.001	0.75
		Miscellaneous Organic Compounds	NY990-00-0	0.001	0.75
CJ Ink Co., Inc.	Printing	Lead Vapors	7489-42-1	0.001	0.75
		Miscellaneous Organic Compounds	NY990-00-0	0.001	0.75

Table 15-9b (cont'd)
Modeled Emission Rates of Existing Industrial Sources
DEC-Registered Facilities and Unpermitted Sources

Facility	Description of Process	Pollutant Name	CAS No.	Hourly Emissions (lb/hr)[1]	Annual Emissions (lb/yr)
Empire City Ironworks	Ironworks	1,1,2-Trichloroethane	79-00-5	0.53	53
		Dioxane	123-91-1	0.014	14

Notes:
(1) Emissions for particulate matter were modeled over a 24-hour averaging period
(2) Particulate matter for auto body paint spray booths assumes 28.6% of total particulate matter is $PM_{2.5}$ (EPA. Compilations of Air Pollutant Emission Factors AP-42. Appendix B-1, Table 4.2.2.8. https://www3.epa.gov/ttn/chief/ap42/appendix/appb-1.pdf. October 1986.)
(3) Particulate matter emissions from all woodworking and non-auto body paint spray booths were conservatively assumed to be $PM_{2.5}$.
(4) Since no SGC or AGC is assigned to this pollutant, it was modeled with isopropyl alcohol for evaluation purposes.

Refined Dispersion Analysis

After compiling the information on facilities with manufacturing or process operations in the study area, maximum potential pollutant concentrations from the emission sources were determined using the EPA AERMOD refined dispersion model. The AERMOD model was run using the same model assumptions and options as described earlier for the refined modeling of heating and hot water systems.

To assess the effects of multiple sources emitting the same pollutants, cumulative source impacts were determined. Predicted worst-case impacts on the projected and potential development sites were compared with the short-term guideline concentrations (SGC) and annual guideline concentrations (AGC) recommended in DEC's DAR-1 AGC/SGC Tables. These guidelines present the airborne concentrations that are applied as a screening threshold to determine if the future residents of the projected and potential development sites could be significantly impacted by nearby sources of air pollution.

Discrete receptors (i.e., locations at which concentrations were calculated) were placed on the potentially affected projected and potential development sites. The receptor network consisted of receptors located at spaced intervals along the sides of the development site from the ground floor to the upper level.

Emission rates and stack parameters, obtained from the DEP permits, were input into the AERMOD dispersion model. For industrial sources where stack parameters were not available, default values referenced in the *CEQR Technical Manual* were used. Where the stack exhaust location was not known, it was assumed to be located at the center of the roof.

Health Risk Assessment

Potential cumulative impacts were evaluated based on the Hazard Index Approach for non-carcinogenic compounds and risk factors for carcinogenic compounds as described in the DEC DAR-1 guidance document. Both methods are based on equations that use health risk information at referenced concentrations for individual compounds to determine the level of health risk posed by an expected ambient concentration of these compounds at a sensitive receptor. For non-carcinogenic compounds, hazard quotients are calculated by dividing the maximum modeled concentration of each pollutant by its respective AGC. The quotients are then summed together to calculate a multi-

contaminant hazard index for each sensitive receptor. The maximum hazard index indicates the worst-case scenario for potential impacts from non-carcinogenic pollutants. For non-carcinogenic compounds, DEC's DAR-1 considers a cumulative hazard index of less than 2.0 to be acceptable.

For carcinogenic compounds, DEC uses risk factors for evaluation of release of pollutants. DEC generally considers an overall incremental cancer risk from cumulative impacts of a proposed action of less than ten-in-one million to be acceptable. Using these factors, the potential cancer risk associated with each carcinogenic pollutant, as well as the total cancer risk of the releases of all of the carcinogenic toxic pollutants combined, can be estimated. If the total incremental cancer risk of all of the carcinogenic toxic pollutants combined is less than ten-in-one million, no significant air quality impacts are predicted to occur due to these pollutant releases.

Potential Impacts from Future Uses

The Proposed Actions expected to occur under the RWCDS for the Proposed Actions includes 930,150 gross square feet (gsf) of industrial uses at nine projected development sites and 171,938 gross square feet (gsf) of industrial uses at five potential development sites. To ensure that future industrial uses at these sites do not result in a potential significant adverse impact on air quality, an (E) Designation (E-848) would be assigned as part of the Proposed Actions for each of these sites. The proposed restrictions would require future proposed manufacturing and processing activities to perform an air quality analysis to demonstrate that emissions would not result in a significant adverse air quality impact.

ADDITIONAL SOURCES

The *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a "large" or "major" emissions source. Major sources are defined as those located at facilities that have a Title V or Prevention of Significant Deterioration air permit, while large sources are defined as those located at facilities that require a State Facility Permit. To assess the potential effects of these existing sources on the projected and potential development sites, a review of existing permitted facilities was conducted. Sources of information reviewed included the DEC Info Locator[19] and DEP permit data.

One existing major source of emissions (i.e., a facility having a Title V Air Permit) within 1,000 feet of the development sites was identified: the New York Power Authority (NYPA) Vernon Boulevard Plant located at 42-30 Vernon Boulevard. Therefore, an analysis was performed to assess the potential effects on projected and potential development sites located within 1,000 feet of this facility.

The AERMOD dispersion model was used in the analysis, with the same meteorological data and background concentrations used for the heating and hot water system analysis. In addition, as described in the methodology for the analysis of heating and hot water sources, total 1-hour NO_2 concentrations were determined using the EPA Tier 3 approach.

[19] NYSDEC. DECinfo Locator https://gisservices.dec.ny.gov/gis/dil/.

The facility emissions for the NYPA plant were determined from the most recent DEC permit renewal application. For exempt equipment (2 boilers), the exact source locations were not available, so it was assumed that the equipment exhausts to a location on the plant site closest to the nearest development sites. **Table 15-10** presents the emission rates and the stack parameters used in the AERMOD analysis for the regulated emission sources.

Table 15-10
Stack Parameters and Emission Rates from the NYPA Vernon Boulevard Plant

Parameter[1]	Value	
	Boilers	Combustion Turbines
No. of Sources	2	2
Total Capacity (mmBTU/hr)	840	14.8
Stack Height (ft)	15	150
Stack Diameter (ft)	1.83	12
Exhaust Flow Rate (fps)	15.8	77
Exhaust Temperature (°F)	307.8 [2]	719
Fuel Type	Natural Gas	Natural Gas
NO_x Short Term Emission Rate (g/s)	0.034	0.6
NO_x Annual Emission Rate (g/s)	0.034	0.6
$PM_{2.5}$ Short Term Emission Rate (g/s)	0.0063	0.35
$PM_{2.5}$ Annual Emission Rate (g/s)	0.0063	0.35

Notes:
[1] All stack parameters from DEC State Facility Permit application except where indicated.
[2] Obtained from DEP Permit database.

E. EXISTING CONDITIONS

The representative criteria pollutant concentrations measured in recent years at DEC air quality monitoring stations nearest to the Project Area are presented in **Table 15-11**. The values presented are consistent with the form of the NAAQS. As shown in the table, the recently monitored levels did not exceed the NAAQS, with the exception of the 8-hour ozone NAAQS. It should be noted that these values are somewhat different from the background concentrations used in the stationary source and mobile source analyses, since these are recently reported monitored values rather than more conservative values used for dispersion modeling. The concentrations presented in **Table 15-11** provide a comparison of the air quality in the rezoning area with the NAAQS, while background concentrations are obtained from several years of monitoring data and represent a conservative estimate of the highest concentrations for future ambient conditions.

Table 15-11
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	CCNY	ppm	1-hour	1.55	35
	CCNY		8-hour	1.2	9
SO_2	Queens College	$\mu g/m^3$	1-hour	13.1	196
PM_{10}	IS 52	$\mu g/m^3$	24-hour	33	150
$PM_{2.5}$	JHS 126	$\mu g/m^3$	Annual	8.1	9
			24-hour	20.1	35
NO_2	IS 52	$\mu g/m^3$	Annual	29.2	100
	IS 52		1-hour	101.8	188
Lead	IS 52	$\mu g/m^3$	3-month	0.0049	0.15
Ozone	Queens College	ppm	8-hour	0.073	0.070

Notes:
(1) The CO and PM_{10} concentrations represent the second-highest value from 2023.
(2) $PM_{2.5}$ annual concentrations are the average of 2021–2023 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentile concentrations in the same period.
(3) The SO_2 1-hour and NO_2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively.
(4) The ozone concentration is based on the 3-year average (2021–2023) of the 4th highest daily maximum 8-hour average concentrations.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2021–2023.

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO ACTION CONDITIONS)

MOBILE SOURCES

CO concentrations in the 2035 No Action condition were determined using the methodology previously described. **Table 15-12** shows future maximum predicted 8-hour CO concentrations, including background concentrations, at the analysis intersections in the No Action condition. The values shown are the highest predicted concentrations for the receptor locations for any of the time periods analyzed.

Table 15-12
Maximum Predicted 8-Hour Average CO No Action Concentrations

Analysis Site	Location	8-Hour Concentration (ppm)
1	Vernon Boulevard and 44th Drive	~~1.29~~1.28
2	Vernon Boulevard and 46th Avenue	~~1.34~~1.32
5	Vernon Boulevard and 48th Avenue	1.32

Notes:
8-hour standard (NAAQS) is 9 ppm.
Concentration includes a background concentration of 1.2 ppm.

$PM_{2.5}$ concentrations for the No Action condition are not presented, since impacts are assessed on an incremental basis.

STATIONARY SOURCES

In the No Action condition, the identified projected development sites are assumed to either remain unchanged from existing conditions, or become occupied by uses that are as-of-right under existing zoning and reflect current trends that are deemed likely to support more active uses. The Proposed Actions would likely result in more development, and therefore, the emissions from heat and hot water systems associated with the Proposed Actions would cumulatively be greater than the emissions from heat and hot water systems under the No Action condition, although the increase would be affected due to the requirements to reduce fossil fuel usage established under Local Law 97 and Local Law 154.

G. THE FUTURE WITH THE PROPOSED ACTIONS (WITH ACTION CONDITIONS)

MOBILE SOURCES

INTERSECTION ANALYSIS

CO concentrations for the Proposed Actions were predicted using the methodology previously described. **Table~~s~~ 15-13 and 15-14** show~~s~~ the future maximum predicted 1-hour and 8-hour average CO concentrations at the intersections studied, respectively. The values shown are the highest predicted concentrations. The results indicate that the Proposed Project would not result in any violations of the 1-hour or 8-hour CO NAAQS at ~~one~~ two of the ~~two~~ three analyzed intersections. ~~In addition, at this intersection, the incremental increase in 8-hour average CO concentrations is small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria.~~ However, the 1-hour and 8-hour CO maximum concentration~~s~~ ~~is~~ are predicted to exceed the NAAQS at the intersection of Vernon and 46th Avenue and *de minimis* criteria at the intersection of Vernon Boulevard and 46th Avenue and Vernon Boulevard and 48th Avenue. This would be considered a significant adverse air quality impact. Therefore, traffic mitigation measures were examined to avoid potential significant impact at this intersection location. Mitigation measures are discussed in Chapter 21, “Mitigation.”

Table 15-13
Maximum Predicted 1-Hour CO
With Action Concentrations (ppm)

Analysis Site	Location	With Action
1	Vernon Boulevard and 44th Drive	6.16
2	Vernon Boulevard and 46th Avenue	65.56
5	Vernon Boulevard and 48th Avenue	15.59

Notes:
1-hour standard is 35 ppm.
Concentrations include a background concentration of 2.52 ppm.
This table is new for the FEIS.

Table 15-~~13~~14
Maximum Predicted 8-Hour CO
With Action Concentrations (ppm)

Analysis Site	Location	No Action	With Action	Increment	*De Minimis*
1	Vernon Boulevard and 44th Drive	~~1.29~~1.28	~~2.71~~2.54	~~1.42~~1.41	~~5.1~~3.8
2	Vernon Boulevard and 46th Avenue	~~1.34~~1.32	~~20.45~~23.28	~~19.1~~22.22~~2~~	~~5.1~~3.8
5	Vernon Boulevard and 48th Avenue	1.39	6.08	5.18	3.8

Notes:
8-hour standard is 9 ppm.
Concentrations include a background concentration of 1.2 ppm.

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations were calculated so that they could be compared with the NAAQS and the *de minimis* criteria, respectively. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in **Tables 15-~~14~~ 15 and 15-~~15~~16**, respectively. **Tables 15-~~14~~ 15 and 15-~~15~~ 16** also present the maximum predicted concentrations in the No Action and With Action condition. The values shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations.

Table 15-~~14~~15
Maximum Predicted 24-Hour Average $PM_{2.5}$
With Action and Incremental Concentrations (µg/m³)

Analysis Site	Location	No Action	With Action	Increment	Criterion
1	Vernon Boulevard and 44th Drive	-	-	~~19.19~~7.28	8.6(1)
		~~19.88~~20.07(2)	~~28.32~~24.90(2)	-	35(3)
2	Vernon Boulevard and 46th Avenue	-	-	~~75.32~~88.49	8.6(1)
		~~20.10~~20.42(2)	~~65.55~~78.51(2)	-	35(3)
3	44th Drive and 11th Street	-	-	~~2.91~~3.97	8.6(1)
		~~20.4~~20.81(2)	~~22.2~~23.23(2)	-	35(3)
4	21st Street and Queens Plaza South	-	-	~~1.67~~2.47	8.6(1)
		~~25.3~~25.35(2)	~~26.5~~27.05(2)	-	35(3)
5	Vernon Boulevard and 48th Avenue	-	-	21.82	8.6(1)
		20.62(2)	34.78(2)	-	35(3)

Notes:
(1) $PM_{2.5}$ de minimis criterion—24-hour average, not to exceed more than half the difference between the background concentration (17.8 µg/m³) and the 24-hour standard of 35 µg/m³.
(2) The 24-hour $PM_{2.5}$ concentration presented represents the maximum of the total 98th percentile. Concentrations presented include a background concentration of 17.8 µg/m³.
(3) NAAQS.

Table 15-~~15~~16
Maximum Predicted Annual Average $PM_{2.5}$
With Action and Incremental Concentrations (µg/m³)

Analysis Site	Location	No Action	With Action	Increment	Criterion
1	Vernon Boulevard and 44th Drive	-	-	~~1.18~~0.68	0.1(1)
		~~7.73~~7.72(2)	~~8.79~~8.38(2)	-	9(3)
2	Vernon Boulevard and 46th Avenue	-	-	~~7.03~~7.58	0.1(1)
		~~8.79~~7.72(2)	~~14.46~~14.92(2)	-	9(3)
3	44th Drive and 11th Street	-	-	~~0.16~~0.23	0.1(1)
		~~7.7~~7.71(2)	~~7,9~~7.93(2)	-	9(3)
4	21st Street and Queens Plaza South	-	-	~~0.1~~0.26	0.1(1)
		~~8.0~~7.98(2)	~~8.2~~8.23(2)	-	9(3)
5	Vernon Boulevard and 48th Avenue	-	-	2.88	0.1(1)
		7.75(2)	10.55(2)	-	9(3)

Notes:
(1) $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 µg/m³
(2) Concentrations presented include a background concentration of 7.6 µg/m³
(3) NAAQS.

The results in **Table 15-~~14~~ 15** show that the 24-hour $PM_{2.5}$ concentrations are below the $PM_{2.5}$ *de minimis* criterion at ~~two~~ three intersections, and the NAAQS at ~~three~~ four of the ~~four~~ five analysis sites. However, the maximum 24-hour $PM_{2.5}$ concentrations are predicted to exceed the *de minimis* criterion at the intersection of Vernon Boulevard and ~~44th Drive~~48th Avenue, and the *de minimis* criterion and NAAQS and Vernon Boulevard and 46th Avenue. As shown in **Table 15-~~15~~16**, total annual $PM_{2.5}$ concentrations are below the NAAQS at three of the ~~four~~ five analysis sites. However, at the intersections of Vernon Boulevard and 46th Avenue and Vernon Boulevard and 48th Avenue, the total annual $PM_{2.5}$ concentration is predicted to exceed the NAAQS. Furthermore, at each of

the ~~four~~ five intersection sites analyzed, the maximum annual incremental $PM_{2.5}$ concentration is predicted to exceed the *de minimis* criterion. This would be considered a significant adverse air quality impact in the absence of traffic mitigation measures (see Chapter 21, "Mitigation").In addition to the mitigation measures discussed in Chapter 21, "Mitigation", between the Draft and Final EIS, further review and evaluation ~~will be~~was performed ~~which is expected~~ to determine whether~~that~~ the identified impacts related to mobile source 24-hour and annual average $PM_{2.5}$ increments ~~will be~~were avoided, with or without the need for traffic mitigation measures. ~~Refined modeling using additional traffic periods will be performed to determine 24-hour average impacts from mobile sources at the affected intersection.~~ Additional modeling of $PM_{2.5}$ concentrations (Grid Analysis) ~~will be~~was performed using more refined or comprehensive analysis procedures to determine the magnitude and extent of neighborhood-scale $PM_{2.5}$ impacts from mobile sources. Other updates ~~may~~ included the use of newer vehicle emissions model data and projections. ~~It is anticipated that these additional measures will reduce $PM_{2.5}$ concentrations below the 24-hour and annual *de minimis* criterion thresholds, possibly without the need for traffic mitigation measures.~~

The results of the grid analysis are presented in **Table 15-17** for the modeled grids. For each grid, the average annual $PM_{2.5}$ concentration was determined at each receptor for the No Action and With Action conditions, and the neighborhood-scale concentration was determined based on the arithmetic mean value for the receptor grid. The incremental annual $PM_{2.5}$ concentrations were determined based on the difference between the neighborhood-scale No Action and With Action concentrations.

Table 15-17
Maximum Predicted Annual Average $PM_{2.5}$
Grid Analysis Incremental Concentrations—Proposed Project ($\mu g/m^3$)

Grid	No Action	With Action	Maximum Increment	Criterion
1	0.09	0.56	0.46	**0.1**[(1)]
2	0.18	0.31	0.13	

Note:
(1) $PM_{2.5}$ *de minimis* criterion—annual (neighborhood scale), 0.1 $\mu g/m^3$.
This table is new for the FEIS.

As shown in the table, the maximum $PM_{2.5}$ neighborhood-scale annual incremental concentration does exceed the criterion at both Grid 1 (Sites 1, 2, 3, and 5) and Grid 2 (Site 4). Therefore, for each of the analyzed intersections, this would be considered a significant adverse air quality impact.

The prediction of future $PM_{2.5}$ concentrations from construction of the projected development sites under the Proposed Actions are based on very conservative assumptions of future traffic conditions and vehicle emissions. For example, the analysis does not assume any significant change in current utilization of gasoline and diesel-powered vehicles versus electric vehicles. Additionally, the modeling procedure employed for prediction of $PM_{2.5}$ concentrations used delays associated with peak traffic periods for assessing delays during non-peak day time conditions for the No Action and With Action conditions. Since the predicted $PM_{2.5}$ incremental concentrations during daytime non-peak periods are conservative, the calculated 24-hour and annual $PM_{2.5}$ incremental concentrations are considered to be conservative.

PARKING ANALYSIS

Based on the methodology previously described, the maximum predicted CO and PM concentrations from the proposed parking facilities at Projected Development Sites 63, and 67 and 69 were analyzed, assuming a near-side sidewalk receptor on the same side of the street (seven feet) as the parking facility, and a far side sidewalk receptor on the opposite side of the street from the parking facility. Potential cumulative pollutant impacts on the far sidewalks adjacent to the garage vents were calculated by adding the impact from the garage exhaust to on-street sources.

A receptor was also modeled at the vent height, 10 feet from the vent, to conservatively assess the air quality impacts on the Projected Development Site building window or other air intake location.

The maximum predicted eight-hour average CO concentration of all the receptors modeled for the three analyzed parking facilities is 1.49 ppm at the building receptor. This value includes a predicted concentration of 0.29 ppm from emissions within the parking garage, and a background level of 1.2 ppm. The maximum predicted concentration is substantially below the applicable standard of 9 ppm and the *de minimis* CO criteria.

The maximum predicted 24-hour and annual average $PM_{2.5}$ increments are 1.32 $\mu g/m^3$ and 0.22 $\mu g/m^3$, respectively. The maximum predicted $PM_{2.5}$ increments are well below the respective $PM_{2.5}$ *de minimis* criteria of 8.6 $\mu g/m^3$ for the 24-hour average concentration and 0.3 $\mu g/m^3$ for the annual concentration. Therefore, the proposed parking garages would not result in any significant adverse air quality impacts.

ANALYSIS OF ELEVATED ROADWAY

As described in Section B, "Methodology for Predicting Pollutant Concentrations," an analysis was undertaken to determine maximum CO and PM concentrations from the elevated portion of the Ed Koch Queensborough Bridge and associated ramps on nearby projected and potential development sites.

Carbon Monoxide

The maximum predicted 1-hour and 8-hour average CO concentrations on the proposed development sites are presented in **Table 15-~~16~~18**. The results show that the maximum With Action CO concentrations at the development sites near the elevated roadway would be well below the 1-hour and 8-hour CO NAAQS in the With Action condition.

Table 15-~~16~~18
Maximum Predicted 8-Hour Average CO Concentrations from the Elevated Roadway on the Proposed Development Sites

Averaging Period	Maximum Total Concentration (ppm)	NAAQS (ppm)
1-Hour	2.3	35
8-Hour	1.5	9

Note: Total concentration includes a background concentration of 1.72 ppm for the 1-hour averaging period and 1.2 ppm for the 8-hour averaging period.

Particulate Matter

Tables 15-~~17~~19 and 15-~~18~~20 present the With Action maximum predicted 24-hour and annual average $PM_{2.5}$ concentrations on the proposed development sites, respectively.

Table 15-~~17~~19
Maximum Predicted 24-Hour Average $PM_{2.5}$ Concentrations from Atypical Roadways on the Proposed Development Sites

Concentration (µg/m^3)	NAAQS
20.1	35
Note: Concentration includes a background concentration of 17.8 µg/m^3.	

Table 15-~~18~~20
Maximum Predicted Annual Average $PM_{2.5}$ from Atypical Roadways on the Proposed Development Sites

Concentration (µg/m^3)[(1)]	NAAQS
8.6	9
Note: [(1)] Concentration includes a background concentration of 7.6 µg/m^3.	

STATIONARY SOURCES

INDIVIDUAL HEAT AND HOT WATER SYSTEMS

Screening Analysis

The screening analysis was performed to evaluate whether potential air quality impacts from the heat and hot water systems associated with the projected and potential development sites could potentially impact other projected and potential development sites, or existing or other proposed buildings.

A total of five projected and five potential development sites passed the initial screening analysis for both No. 2 oil and natural gas. Of the ~~47~~ 46 projected and 10 potential development sites that did not pass the initial screening, ~~11~~10 projected and 8 potential development sites were found to pass the screening analysis with restrictions (either a fuel restriction, stack setback and/or placing heating and hot water stacks on the tallest tier, or a combination of these).

Refined Dispersion Analysis

Based on the screening analysis presented above, ~~36~~ 37 projected and two potential development sites required a refined modeling analysis to determine the potential for air quality impacts. The results of the refined modeling analysis determined the following:

- If the fuel type is restricted to natural gas only, and the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, no significant adverse impacts are predicted at six of the sites (five projected and one potential development sites).
- If the fuel type is restricted to natural gas only, the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, and low NO_x burners

are required to address NO_2 emissions, no significant adverse impacts are predicted at ~~six~~ 12 of the sites (~~five~~ 11 projected and one potential development sites).

- If the fuel type is restricted to natural gas only, heating and hot water system stacks are set back from the building edge, and the height of the exhaust stack is increased where feasible to address $PM_{2.5}$ and NO_2 emissions, and low NO_x burners are required to address NO_2 emissions, no significant adverse impacts are predicted at 15 of the projected development sites.
- If the fuel type for heating systems is restricted to natural gas only, and domestic hot water systems are restricted to electric-powered equipment, no significant adverse impacts are predicted at five projected development sites.
- If heating and hot water systems are restricted to electric-powered equipment, no significant adverse impacts are predicted at one projected development site.

Table 15-~~19~~21 presents a summary of the analysis results and proposed restrictions, with additional detail provided in **Tables 15-~~20~~22** (projected development sites) **and 15-~~21~~23** (potential development sites).

Overall, to preclude the potential for significant adverse air quality impacts on other projected and potential development sites, or existing buildings, from the heat and hot water emissions, an (E) Designation (E-848) would be assigned as part of the Proposed Actions for the 47 projected and 10 potential development sites. These designations would specify the various restrictions, such as type of fuel to be used, the use of low NO_x burners, the distance that the vent stack on the building roof must be from its lot line(s), and/or the increase of the exhaust stack height.

For the publicly~~City~~ owned parcels, the implementation of the restrictions would be required through the Land Disposition Agreement between the New York City Department of Housing Preservation and Development (HPD) and the future developer with oversight provided through HPD.

Table 15-2119
Heating and Hot Water System Analysis Summary

Analysis	Projected Development Sites		Potential Development Sites	
	Pass	Fail	Pass	Fail
Screening Analyses				
#2 Oil Initial Screening	105	4247	65	910
Natural Gas Initial Screening	126	4046	75	810
#2 Oil Secondary Screening – Stack Setback	125	4042	72	8
Natural Gas Secondary Screening – Stack Setback	169	3637	138	2
Refined Analysis	**Number of Sites**		**Number of Sites**	
Natural Gas and Stack Height Requirement	65		1	
Natural Gas, Stack Height, and Low NO_x Requirement	911		1	
Natural Gas, Stack Setback, Stack Height and Low NO_x Requirement[1]	15		-	
Natural Gas, Stack Setback, Stack Height, Low NO_x Requirement ~~Electric Powered Heating and Hot Water Systems~~ and Electric Powered Domestic Hot Water Systems	5		-	
Electric Powered Heating and Hot Water Systems	1		-	

Note:
(1) For the publicly~~City~~ -owned parcels, the implementation of the restrictions would be required through the Land Disposition Agreements between HPD and the future developers with oversight provided through HPD.

Table 15-2220
Heating and Hot Water System Analysis—Results for Projected Development Sites

Site	Bldg. Height	#2 Oil Screen	Natural Gas Screen	Natural Gas Modeled Concentration (µg/m³)					Requires (E) Designation (Yes/No)
				$PM_{2.5}$ 24-hour	$PM_{2.5}$ Annual	NO_2 1-hour	NO_2 Annual	$PM_{2.5}$ 24-hour/$PM_{2.5}$ Annual/NO_2 1-hour Standard	
1	425	Fail	Fail	8.42	0.16	168.5	0.80	8.6 / 0.3 / 188 / 100	Yes
2	138	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	~~Yes~~No
3	138	Fail	Fail	7.02	0.26	166.5	1.25	8.6 / 0.3 / 188 / 100	Yes
4	88	Fail	Fail	0.72	0.02	121.1	0.24	8.6 / 0.3 / 188 / 100	Yes
5	88	Fail	Fail	0.31	0.01	107.1	0.15	8.6 / 0.3 / 188 / 100	Yes
7	108	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
9	88	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
10	148	Fail	Fail	5.96	0.09	165.2	0.44	8.6 / 0.3 / 188 / 100	Yes
12	138	Fail	Fail	5.51	0.14	136.7	0.66	8.6 / 0.3 / 188 / 100	Yes
13	238	Fail	Fail	6.13	0.16	152.5	0.78	8.6 / 0.3 / 188 / 100	Yes
14	88	Fail	Fail	0.82	0.03	111.3	0.33	8.6 / 0.3 / 188 / 100	Yes
15	88	Fail	Fail	1.65	0.05	125.7	0.64	8.6 / 0.3 / 188 / 100	Yes
16	148	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
17A	605	Fail	Fail	6.00	0.14	140.7	0.66	8.6 / 0.3 / 188 / 100	Yes
17B	180	Fail	Fail	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
18	258	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
19	718	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
20	348	Fail	Fail	5.65	0.15	167.6	0.73	8.6 / 0.3 / 188 / 100	Yes
21	688	Fail	Fail	4.29	0.06	131.9	0.29	8.6 / 0.3 / 188 / 100	Yes
22	738	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
25	148	Fail	Fail	4.61	0.09	135.2	0.45	8.6 / 0.3 / 188 / 100	Yes
26	118	Fail	Fail	5.04	0.09	148.7	0.42	8.6 / 0.3 / 188 / 100	Yes
27	148	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
28	153	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
29	153	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
30	123	Fail	Fail	8.38	0.26	157.7	1.26	8.6 / 0.3 / 188 / 100	Yes
31	138	Fail	Fail	4.93	0.12	138.2	0.57	8.6 / 0.3 / 188 / 100	Yes
32	153	Fail	Fail	7.07	0.18	140.6	0.89	8.6 / 0.3 / 188 / 100	Yes
38	138	Fail	Fail	1.96	0.05	128.5	0.66	8.6 / 0.3 / 188 / 100	Yes
39	153	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
40	108	Fail	Fail	7.95	0.11	158.5	0.52	8.6 / 0.3 / 188 / 100	Yes
42	138	Fail	Fail	7.00	0.22	152.4	1.07	8.6 / 0.3 / 188 / 100	Yes
43	168	Fail	Fail	8.11	0.24	153.9	1.14	8.6 / 0.3 / 188 / 100	Yes
45	198	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
46	138	Fail	Fail	5.56	0.16	133.4	0.77	8.6 / 0.3 / 188 / 100	Yes
49	153	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
50	138	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
51	198	Fail	Fail	8.28	0.09	178.7	0.44	8.6 / 0.3 / 188 / 100	Yes
52	198	Pass	Fail	6.51	0.14	143.0	0.70	8.6 / 0.3 / 188 / 100	Yes
54	278	Fail	Fail	5.15	0.14	140.5	0.67	8.6 / 0.3 / 188 / 100	Yes
57	138	Fail	Fail	4.71	0.07	125.7	0.33	8.6 / 0.3 / 188 / 100	Yes
59	123	Fail	Fail	3.95	0.11	125.4	0.54	8.6 / 0.3 / 188 / 100	Yes
61	138	Fail	Fail	3.80	0.11	131.5	0.52	8.6 / 0.3 / 188 / 100	Yes

Table 15-22~~15-20~~

Heating and Hot Water System Analysis—Results for Projected Development Sites

Site	Bldg. Height	#2 Oil Screen	Natural Gas Screen	Natural Gas Modeled Concentration (µg/m³)					Requires (E) Designation (Yes/No)
				$PM_{2.5}$ 24-hour	$PM_{2.5}$ Annual	NO_2 1-hour	NO_2 Annual	$PM_{2.5}$ 24-hour/$PM_{2.5}$ Annual/NO_2 1-hour Standard	
62	198	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	~~Yes~~No
63A	735	Fail	Fail	8.00	0.14	188.0	0.68	8.6 / 0.3 / 188 / 100	Yes
63B	1,035	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
63C	655	Fail	Fail	4.36	0.06	173.2	0.30	8.6 / 0.3 / 188 / 100	Yes
63D	695	Fail	Fail	1.33	0.04	150.8	0.52	8.6 / 0.3 / 188 / 100	Yes
64A	495	Fail	Fail	7.81	0.16	154.3	0.78	8.6 / 0.3 / 188 / 100	Yes
64B	595	Fail	Fail	1.34	0.04	137.0	0.50	8.6 / 0.3 / 188 / 100	Yes
65	573	Fail	Fail	5.76	0.06	152.3	0.29	8.6 / 0.3 / 188 / 100	Yes
66	138	Fail	Fail	4.22	0.07	137.4	0.36	8.6 / 0.3 / 188 / 100	Yes
67A	1,175	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
67B	95	Fail	Fail	3.99	0.10	126.1	0.50	8.6 / 0.3 / 188 / 100	Yes
67C	625	Fail	Fail	5.81	0.10	157.9	0.48	8.6 / 0.3 / 188 / 100	Yes
68	338	Fail	Fail	5.78	0.09	147.0	0.45	8.6 / 0.3 / 188 / 100	Yes
69A	335	Fail	Fail	7.76	0.18	167.9	0.88	8.6 / 0.3 / 188 / 100	Yes
69B	295	Fail	Fail	5.82	0.07	158.0	0.35	8.6 / 0.3 / 188 / 100	Yes
69C	535	Fail	Fail	6.56	0.15	164.3	0.73	8.6 / 0.3 / 188 / 100	Yes
69D	995	Fail	Fail	7.15	0.19	168.0	0.90	8.6 / 0.3 / 188 / 100	Yes
70	88	Fail	Fail	4.39	0.16	134.6	0.78	8.6 / 0.3 / 188 / 100	Yes
71	418	Fail	Fail	7.23	0.12	180.5	0.59	8.6 / 0.3 / 188 / 100	Yes

Table 15-23~~15-21~~

Heating and Hot Water System Analysis—Results for Potential Development Sites

Site	Building Height	#2 Oil Screening	Natural Gas Screening	Natural Gas Modeled Concentration (µg/m³)					Requires (E) Designation (Yes/No)
				$PM_{2.5}$ 24-hour	$PM_{2.5}$ Annual	NO_2 1-hour	NO_2 Annual	$PM_{2.5}$ 24-hour/$PM_{2.5}$ Annual/NO2 1-hour Standard	
A	88	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
B	88	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
C	88	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
D	138	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
E	148	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
F	153	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
G	213	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
H	183	Fail	Fail	3.79	0.11	148.20	0.52	8.6 / 0.3 / 188 / 100	Yes
I	183	Fail	Fail	1.37	0.03	119.78	0.39	8.6 / 0.3 / 188 / 100	Yes
J	153	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
K	183	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
L	183	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes
M	198	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	No
N	198	Pass	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	~~Yes~~No
O	138	Fail	Pass	—	—	—	—	8.6 / 0.3 / 188 / 100	Yes

Cumulative Impacts from Heat and Hot Water Systems

An analysis was conducted to evaluate potential air quality impacts from groups or "clusters" of heat and hot water systems in close proximity with similar stack heights. Four clusters were identified.

A refined analysis was performed for the clusters using the AERMOD model. The analysis was performed using the general assumptions and procedures outlined earlier for individual development sites. The maximum NO_2 1-hour, $PM_{2.5}$ 24-hour, and $PM_{2.5}$ annual concentrations predicted by the AERMOD model are presented in **Table ~~15-22~~15-24**.

Table ~~15-22~~15-24
Cumulative Heating and Hot Water System Analysis
Maximum Pollutant Concentrations – Refined Results (µg/m³)

Pollutant	Averaging Period	Maximum Total Concentration			NAAQS / De Minimis
		Cluster 1	Cluster 2	Cluster 3	
NO_2	1-Hour	93.2	23.7	11.6	188
	Annual	34.7	33.1	33.0	100
$PM_{2.5}$	24-Hour	5.0	1.3	0.6	8.6
	Annual	0.14	0.04	0.02	0.3

Notes:
The $PM_{2.5}$ *de minimis* criteria for the 24-Hour period is half the difference between the NAAQS of 35 µg/m³ and the ambient monitored background of 17.8 µg/m³, and 0.3 µg/m³ for the annual period.
The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.

For Clusters 1, 2, and 3, the development sites would be required to exclusively use natural gas as the type of fuel for heating and hot water systems, to avoid a potential significant adverse air quality impact. An (E) Designation (E-848) would be assigned as part of the Proposed Actions for each of these sites.

Analysis of Potential Impacts from Existing Uses

As discussed above, a study was conducted to analyze industrial uses within 400 feet of the projected and potential development sites. DEP-BEC and DEC permit databases were used to identify existing sources of emissions. A total of 25 permitted facilities were analyzed, as well as 20 unpermitted facilities. The information from these permits (emission rates, stack parameters, etc.) was input to the AERMOD dispersion model.

Using the modeling approach outlined above, concentrations were determined at each development site. At certain locations the maximum concentrations were predicted to exceed the associated limit. Provided in **Table 15-~~23~~25** is a list of projected and potential development sites that are potentially affected, as well as the industrial sources in the area that contributed to the modeled impact.

Table 15-~~23~~25
Projected and Potential Development Sites Exceeding an SGC or AGC

Site	Pollutant	Emission Source
61	Formaldehyde	Manhattan Cabinetry
H	Ethyl-3-ethoxyproporionate	21st St Auto Repair
O	Formaldehyde	Manhattan Cabinetry

Table ~~15-24~~15-26 presents the maximum predicted pollutant concentrations at the projected and potential development sites using the AERMOD refined dispersion model. The table also lists the SGC and AGC for each air toxic pollutant. The table reflects the restrictions imposed with the proposed (E) designations in place.

Table ~~15-24~~15-26
Maximum Modeled Impacts on Projected and Potential Sites from Industrial Sources

Pollutant	CAS Number	AERMOD Model Short-Term Impact (µg/m^3)	SGC (µg/m^3)	AERMOD Model Annual Impact (µg/m^3)	AGC (µg/m^3)
2-Pentanome, 4-Methyl =MIBK	108-10-1	816	31,000	5	3,000
Acetone	67-64-1	5,230	180,000	7	30,000
Aluminum Oxide	1344-28-1	--	--	0.5	2.4
Amyl Acetate	628-63-7	449	53,000	2	630
Antimony Oxide	1314-60-9	--	--	0.5	1.3
Barium Sulfate	7727-43-7	--	--	1	12
Butanol	71-36-3	--	--	1	1,500
Butyl Acetate	123-86-4	5,230	71,300	13	565
Butyl Benzyl Phthalate	85-68-7	--	--	0.31	0.42
Butyl Cellosolve	111-76-2	66	4,700	1	1,600
Carbon Black	1333-86-4	--	--	1	7
Carbon Monoxide	630-08-0	830	40,000	22	10,000
Copper	7440-50-8	0.24	100	0.002	0.48
Dibutyl Phthalate	84-74-2	--	--	0.3	12
Dioctyl Phthalate	117-81-7	--	--	0.34	0.42
Ethyl 3-Ethoxypropionate	763-69-9	139.7	140	1	64
Ethyl Acetate	141-78-6	--	--	2	3,400
Ethylbenzene	100-41-4	--	--	1	1,000
Formaldehyde	50-00-0	6	30	0.059	0.06
Graphite	7782-42-5	--	--	1.1	4.8
Heptane, N-	142-82-5	2,092	210,000	3	3,900
Iron Oxide	1309-37-1	--	--	2	12
Isobutyl Acetate	110-19-0	1,046	71,300	1	565
Isobutyl Alcohol	78-83-1	--	--	0.1	360
Isopropyl Alcohol [(2)]	67-63-0	5,323	98,000	7	7,000
Lead	7489-42-1	0.002	0.15	0.001	0.038
MEK	78-93-3	5,230	13,000	3	5,000
Methanol	67-56-1	11	33,000	0	4,000
Methoxypropylacetate	108-65-6	1,046	36,850	2	2,000
Methyl Amyl Ketone	110-43-0	--	--	0	550
Methylcyclohexane	108-87-2	--	--	1	3,800
Mica	12001-26-2	--	--	1	7.1
Naphtha Heavy Aromatic	64742-94-5	--	--	0.5	100
Naphtha Light Aliphatic	64742-89-8	--	--	0.5	3,200
Naphtha Light Aromatic	64742-95-6	--	--	0.5	100
Naphtha, Heavy Alkylate	64742-47-8	--	--	1	900
Nickel Oxide	1313-99-1	0.108	0.201	0.0010	0.0053
Nitrogen Dioxide	NY210-00-0	97	188	0	100
Petroleum Ether	8032-32-4	--	--	0.1	900
PM_{10}	NY075-00-0	11	150	10.65	--

Table ~~15-24~~15-26 (cont'd)
Maximum Modeled Impacts on Projected and Potential Sites from Industrial Sources

Pollutant	CAS Number	AERMOD Model Short-Term Impact (µg/m^3)	SGC (µg/m^3)	AERMOD Model Annual Impact (µg/m^3)	AGC (µg/m^3)
$PM_{2.5}$	NY075-02-5	24	35	7.75	9
Sulfur Dioxide	7446-09-5	0.151	196	0.000	80
Titanium Dioxide	13463-67-7	--	--	4	24
Toluene	108-88-3	5,230	37,000	6	5,000
Xylene	1330-20-7	3,242	22,000	4	100

Notes:
(1) Conservatively assumes all particulate emissions would be $PM_{2.5}$. Federal 24-hour and annual standard for $PM_{2.5}$ used.
(2) Includes VOCs which were modeled as Isopropyl Alcohol.
Source: DEC, DAR-1 AGC/SGC Tables, February 2021.

To preclude the potential for significant adverse industrial source air quality impacts an (E) designation for air quality would be incorporated into the rezoning proposal. The text of the (E) designation is presented in **Appendix H** along with a listing of the three sites (comprising one projected and two potential sites).

As stated above, there are several projected and potential development sites that are potentially significantly impacted by existing industrial source permits in the area. These conclusions are based on conservative assumptions regarding the permit data and modeling. For this ~~D~~FEIS, it is proposed that an (E) designation be applied to these projected and potential development sites that would avoid these impacts.

As currently proposed, the (E) designations would require that new residential and/or commercial development, enlargement, or change of use would meet specified conditions designed to preclude adverse air quality effects. Specifically, fee owners of properties on which the (E) designations would be mapped would need to demonstrate to DEP that any new development, enlargement, or change of use has inoperable windows and does not include air intakes, unless such intakes incorporate alternative design features and/or technologies recognized as effective under industry standards. New York law requires operable windows in habitable portions of residential buildings and residential development, enlargement, or change of use on the referenced property is therefore restricted under current conditions.

These conditions would apply only if the emissions and/or contaminants identified in the air quality analyses were to continue to be present at the time that the fee owner of the property subject to the (E) designation seeks to satisfy the (E) requirements. If the fee owner could demonstrate to DEP that the emissions, contaminants, or exposure pathways no longer existed or have been reduced below impact levels, the conditions would not apply.

Health Risk Assessment

Cumulative impacts were also determined for the combined effects of multiple air contaminants in accordance with the approach described in the "Methodology for Predicting Pollutant Concentrations" section of this chapter. Using the predicted concentrations of each pollutant, the maximum hazard index and total cancer risk was calculated for each affected

projected and potential development site associated with the Proposed Actions. The hazard index approach was used to determine the effects of multiple non-carcinogenic compounds and the cancer risk factors were used to determine the effects of carcinogenic compounds. **Table ~~15-25~~15-27** and **Table ~~15-26~~15-28** present the results of the assessment of cumulative non-carcinogenic and carcinogenic effects on the Proposed Actions, respectively. The estimated pollutant concentrations and the concentration to AGC pollutant ratios presented in the tables represent the values at the receptor location where the maximum cumulative results were predicted, and consequently are in most cases different than the overall maximum values presented in **Table ~~15-25~~15-27**.

Table ~~15-25~~15-27
Estimated Maximum Hazard Index

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m³)	AGC (µg/m³)	Concentration to AGC Pollutant Ratio
Non-Carcinogenic Compounds				
2-Pentanome, 4-Methyl =MIBK	108-10-1	4.79	3000	1.60E-03
Acetone	67-64-1	7.41	30,000	2.47E-04
Aluminum Oxide	1344-28-1	0.53	2.4	2.22E-01
Amyl Acetate	628-63-7	1.79	630	2.85E-03
Antimony Oxide	1314-60-9	0.53	1.3	4.09E-01
Barium Sulfate	7727-43-7	0.53	12	4.43E-02
Butanol	71-36-3	0.61	1,500	4.05E-04
Butyl Acetate	123-86-4	13.18	565	2.33E-02
Butyl Cellosolve	111-76-2	0.53	1,600	3.32E-04
Carbon Black	1333-86-4	0.53	7	7.60E-02
Carbon Monoxide	630-08-0	21.74	10,000	2.17E-03
Copper	7440-50-8	0.00	0.48	4.10E-03
Dibutyl Phthalate	84-74-2	0.34	12	2.82E-02
Ethyl 3-Ethoxypropionate	763-69-9	0.51	64	7.91E-03
Ethyl Acetate	141-78-6	1.60	3,400	4.69E-04
Ethylbenzene	100-41-4	1.06	1,000	1.06E-03
Graphite	7782-42-5	1.06	4.8	2.22E-01
Heptane, N-	142-82-5	2.73	3,900	6.99E-04
Iron Oxide	1309-37-1	2.13	12	1.78E-01
Isobutyl Acetate	110-19-0	1.17	565	2.07E-03
Isobutyl Alcohol	78-83-1	0.12	360	3.32E-04
Isopropyl Alcohol	67-63-0	6.76	7,000	9.66E-04
MEK	78-93-3	2.57	5000	5.14E-04
Methanol	67-56-1	0.08	4000	1.95E-05
Methoxypropylacetate	108-65-6	1.57	2000	7.86E-04
Methyl Amyl Ketone	110-43-0	0.06	550	1.02E-04
Methylcyclohexane	108-87-2	0.95	3800	2.50E-04
Mica	12001-26-2	1.06	7.1	1.50E-01
Naphtha Heavy Aromatic	64742-94-5	0.53	100	5.32E-03
Naphtha Light Aliphatic	64742-89-8	0.53	3200	1.66E-04
Naphtha Light Aromatic	64742-95-6	0.53	100	5.32E-03
Naphtha, Heavy Alkylate	64742-47-8	0.53	900	5.91E-04
Petroleum Ether	8032-32-4	0.14	900	1.55E-04
Titanium Dioxide	1317-80-2	4.25	24	1.77E-01
Toluene	108-88-3	5.71	5000	1.14E-03
Xylene	1330-20-7	3.89	100	3.89E-02
			Total Hazard Index:	1.61
			Hazard Index Threshold Value:	2.00

Source: DEC, DAR-1, February 2021.

As shown in **Table ~~15-25~~15-28**, the maximum hazard index at an individual receptor location is less than 2.0, the level considered by DEC's DAR-1 to be significant. Therefore, based upon the cumulative air toxics analyses, the Proposed Actions would not result in a significant hazard.

Table ~~15-26~~15-28
Estimated Maximum Cancer Risk

Pollutant	CAS Number	Estimated Annual Pollutant Concentration (µg/m³)	AGC (µg/m³)	Concentration to AGC Pollutant Ratio
Butyl Benzyl Phthalate	85-68-7	0.312	0.42	7.42E-01
Dioctyl Phthalate	117-81-7	0.339	0.42	8.07E-01
Formaldehyde	50-00-0	0.059	0.06	9.89E-01
Nickel Oxide	1313-99-1	0.001	0.005	1.89E-01
			Total Cancer Risk:	2.73
			Cancer Risk Threshold Value:	10

Source: DEC, DAR-1, February 2021.

As shown in **Table ~~15-26~~15-28**, the maximum hazard index at an individual receptor location is less than the cancer risk threshold value of 10 in a million. Therefore, based upon the cumulative air toxics analyses, the Proposed Actions would not result in a significant hazard.

Potential Impacts from Future Uses

Under the proposed zoning, (E) Designations are proposed to avoid impacts on privately owned parcels on development sites with respect to industrial uses. A description of the requirements of those (E) Designations are found in **Appendix H**.

ADDITIONAL SOURCES

Potential stationary source impacts on the Proposed Project from the existing NYPA Vernon Boulevard Plant were determined using the AERMOD model. The maximum estimated annual concentrations of NO_2, short-term and annual concentrations of $PM_{2.5}$, and short-term concentrations of SO_2 from the modeling were added to the background concentrations to estimate total concentrations on the Proposed Project. Total 1-hour NO_2 concentrations were determined following the refined EPA "Tier 3" approach described earlier for the heating and hot water system analysis. The results of the AERMOD analyses are presented in **Table ~~15-27~~15-29**.

Table ~~15-27~~15-29
Maximum Modeled Pollutant Concentrations on the Proposed Project (µg/m^3)—Additional Sources

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	NAAQS
NO_2	Annual	1.01	32.8	33.9	100
	1-hour [(1)]	108	N/A	108	188
$PM_{2.5}$	24-hour	2.92	17.8	20.7	35
	Annual	0.37	7.6	8.0	9

Notes:
[(1)] The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.

As shown in **Table ~~15-27~~15-29**, the predicted pollutant concentrations for all of the pollutant time averaging periods shown are below their respective standards. Therefore, no potential for significant adverse air quality impacts on the Proposed Project from the existing large and major sources is predicted. ✷